Telephony.

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A TELEPHONE MAN'S CREED.

From a Michigan Subscriber to TELEPHONY.

I believe that the telephone business is the greatest in the world.

I believe no other legitimate business enterprise offers such assurance of substantial financial return to the investor.

I believe that its possibilities are just being realized, and that it is destined to attain an impregnable stability.

I believe in the ability, integrity, resourcefulness and determination of the telephone managers of the country.

I believe in faith, loyalty and a co-operative spirit.

I believe in the growing tolerance of each towards the differing views of his neighbor.

I believe that this will result in a broadening of the common ground, and an even closer alliance than has yet been known.

I believe that, thereby, the public will be better served and the interests of the investor better conserved.

I believe that every man should lay aside personal prejudice and stand shoulder to shoulder with his brethren in the field in everything pertaining to the advancement of the telephonic art and the wider spread of the industry.

An "Outward and Visible Sign" of Prosperity.

Reports from New York indicate what is generally regarded as an infallible sign of confidence on the part of the country's railroads. This is the giving out of numerous contracts for new rolling stock.

An order for 29 six-wheel switching engines has been placed by the Chicago & Northwestern with the Baldwin Locomotive Works. This company will build two mogul engines for the Jonesboro, Lake City & Eastern; five switching engines for the Burlington; five switching engines for the Chicago, St. Paul, Minneapolis & Omaha, besides two switching engines for small roads.

Car orders recently reported are: 2,000 refrigerator cars, placed with the American Car & Foundry Co. by the Pacific Fruit Express; 300 rack cars, placed with the Laconia Car Co., and 200 flat and gondola cars placed with the Standard Steel Car Co. by the Maine Central; 4,550 cars of different type distributed among the various car-building concerns by the Northern Pacific; 1,000 box cars ordered from the American Car & Foundry Co. by the San Antonio & Aransas Pass; and 100 steel passenger coaches ordered by the New Haven from the Standard Steel Car Co.

Railroads are not accustomed to invest in rolling stock during, or in the face of, industrial depression. Here, then, is new and substantial evidence that we are, as a country, exceedingly well-to-do.

The Operator's Physical Condition and Surroundings.

With the increasing demand for telephone operators, necessitated by the extensive use of the telephone, the operating officials of telephone companies set about to discover methods for rendering the operators more efficient and for making their work lighter and pleasanter. Means were taken to relieve the various strains upon the operators, as it is admitted that operating is quite a nervous strain upon the operators.

The work of the operators was watched closely and it was found that by systematizing and reducing the motions made in putting through a call, such as picking up the cord nearest the line which was to be answered, the work could be accomplished with much less muscular exertion than formerly. Then it was discovered that the use of set phrases by the operators in answering and otherwise handling calls would reduce the mental strain. That is, long phrases which would tend to irritate, were eliminated and all operators were required to use the same expression.

The operating force was so arranged as to save friction between its members. Only those whose physical and mental characteristics indicated fitness for telephone work, were selected for operators, supervisors and chief operators.

Physicians recognize that inspiration is a nerve tonic and that more work can be obtained through inspiration than by

driving, as driving is a nerve stimulant and not a tonic. Inspiration produces nervous energy, while driving consumes nervous energy. An operating force which is driven never accomplishes the best work, while a force which has no disturbing influences in or about it, produces the very best results in the matter of service. Hence the importance of supervisors and chief operators being selected for their ability to inspire operators to do good work.

A study has been made as to working conditions which produce the least amount of nervous strain. The hours are so arranged that the rest periods, lunch periods, etc., come at proper intervals. The chairs at the switchboards are designed especially for proper support in the position which is best for the body. Rest rooms equipped with easy chairs, cots, etc., are important features in most exchanges. The amount of work which each operator is expected to do has been standardized, being determined from a study of statistics extending over long periods. This has been placed low enough to avoid fatigue.

The arrangements for providing light and air are well looked after. With the advances made in the illumination of buildings by proper distribution of tungsten and other high efficiency lamps, progress has been made in the lighting of telephone exchanges. In many exchanges the system of lighting switchboards by means of electric lamps placed in a reflecting trough on the top of the board has been abandoned in favor of tungsten lamps. These are suspended from the ceiling and at a certain distance above and in front of the board. With proper spacing and efficient reflectors, very satisfactory results have been obtained.

Ventilation of exchanges has been a source of much experimenting. Probably one of the most effective and at the same time simple methods is the "stand" exercise which is now practised in many exchanges. For five minutes at intervals throughout the day the operators stand while doing their work while the windows of the operating room are opened to allow fresh air to enter. This and other methods were described in a late issue of TELEPHONY. The matter of ventilation is of importance at this season of the year as with the approach of cold weather, the tendency is to close all windows. Chief operators should see that systematic ventilation is obtained as poor air in the operating room has a decidedly bad effect on the service.

Encourage the Joy of Life.

"Conversation is one of the most important things in your life, because it is the point of vital contact with other minds," says a writer in the Delineator. "By it you mold others and are molded by them. If you listen to conversation that expresses hope and courage and a love of life, it tends to make you feel that way, too. But if you listen to conversation that throws cold water on your good intentions, or holds up the bad instead of the good, or makes you feel that life is a very commonplace, humdrum affair, it tends to draw you down into its own mental vortex and takes away the natural joy of living."

Here is someone with the right idea. This is one of the things not learned in school. Instinctively we dislike the man and woman who are always seeing trouble ahead and we turn away from them and their pessimistic chatter. But we as naturally turn towards the ones who, recognizing at times that things are not quite all they should be, at least face conditions with a smile or a grin and refuse to see the world through a gray mist. Get in the right class, if you are not already there!

Boosting the Long Distance Business.

In one of its advertisements the Bell system quotes a letter written by an Eastern grain man to demonstrate the possibilities of the profitable use of toll service. The letter, unsigned, is as follows:

"I had a cargo of grain to sell, and started to call on customers in western Maine and New Hampshire. Being unable to make suitable railroad connections, I decided to telephone some of my customers.

This experiment proved so satisfactory that I continued selling by telephone.

In two days I had made 38 toll calls from Portland. Result, sale of 126 cars of grain worth $74,400. The toll charges amounted to $13.50."

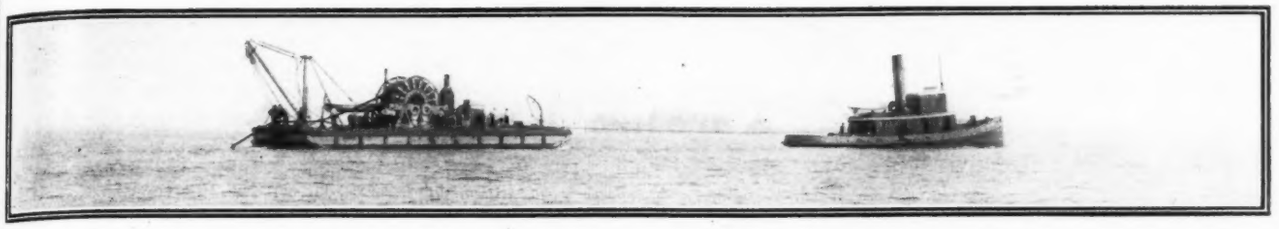
This, the company declares, is a bona fide statement. It is certainly an impressive showing for prospective long distance customers, and one which might, without difficulty be paralleled in almost any locality and by any company.

The Kicker.

It is hard to determine the exact status of the kicker. Sometimes he does good and sometimes he does harm—mostly to himself. The particular kicker we have in mind at the moment is not the man who demands what are clearly his rights, of which he is being defrauded, and who must always be regarded with respect, if not with liking, but the chap whose opposition to things as they are, has become chronic, and whose kicking, consequently, has lost all virtue—who has degenerated into a plain scold and a common nuisance.

His number is legion. His condition may be due to a fond belief that his kind is the only one that ever gets anything fit to eat in a hotel, or the right and proper attention on a train, or full value from a telephone company. Or it may be ascribable to a diseased brain or acute indigestion. Whatever the cause, he is intolerable. There is no known permanent cure, but a temporary amelioration is sometimes effected by a short arm jab to the jaw. This, sad to say, may be but infrequently resorted to, although its efficacy is undoubted.

In our brief career we have seen only one of this variety comprehensively "come up with." He was a traveling salesman and, as a cub, hoping to draw knowledge from the fount of experience, we watched him systematically kick his way through a very decent meal. After the waitress had gone back to the kitchen for him for the sixth time, he turned to us with a sardonic twinkle in his eye and remarked: "It's the kicker who gets the best there is to be had, son." We were inclined to doubt the truth of the assertion at the time, but we were convinced of its fallacy when, at dinner that evening, we saw the waitress surreptitiously inject an unpleasant and entirely foreign substance into his soup just as she emerged from the kitchen to serve it.



Placing a Submarine Telephone Cable in San Francisco Bay

Details of Laying of a 154-Pair Steel Armored Conductor from San Franciseo to Oakland to Give Service to That And Other Bay Cities—Stop at Goat Island to Equip with Loading Coils—Description of Specially Constructed Barge, "Repairman"

This paper recently announced the issuance of a grant to the Pacific Telephone & Telegraph Co., at San Francisco, to lay a submarine cable across the bay to Oakland. The work has now been completed without a hitch and, through the courtesy of D. P. Fullerton, division superintendent of plant, TELEPHONY is enabled to print some excellent photographs of the work in process and the equipment employed.

One picture shows, in some detail, the apparatus on the deck of the cable-carrying lighter, the "Repairman"; another, the tug towing the barge across the bay; and the third, the landing of the San Francisco end of the cable at Goat Island, where loading coils were introduced.

"The cable," writes Mr. Fullerton, "is the largest submarine cable that we have handled, comprising 154 pr., 19 gauge conductor, paper insulation, lead sheath and steel armored. It is 23,000 ft. in length and weighs 16 lb. to the foot, and is equipped with loading coils. It will supply additional circuits for use between San Francisco and Oakland, Alameda and Berkeley, exclusively.

"The cable was laid in two sections, one section from San Francisco to Goat Island, and one from Goat Island to the Southern Facific Mole, Oakland, the landing at Goat Island being made only for the purpose of the introduction of the loading coils.

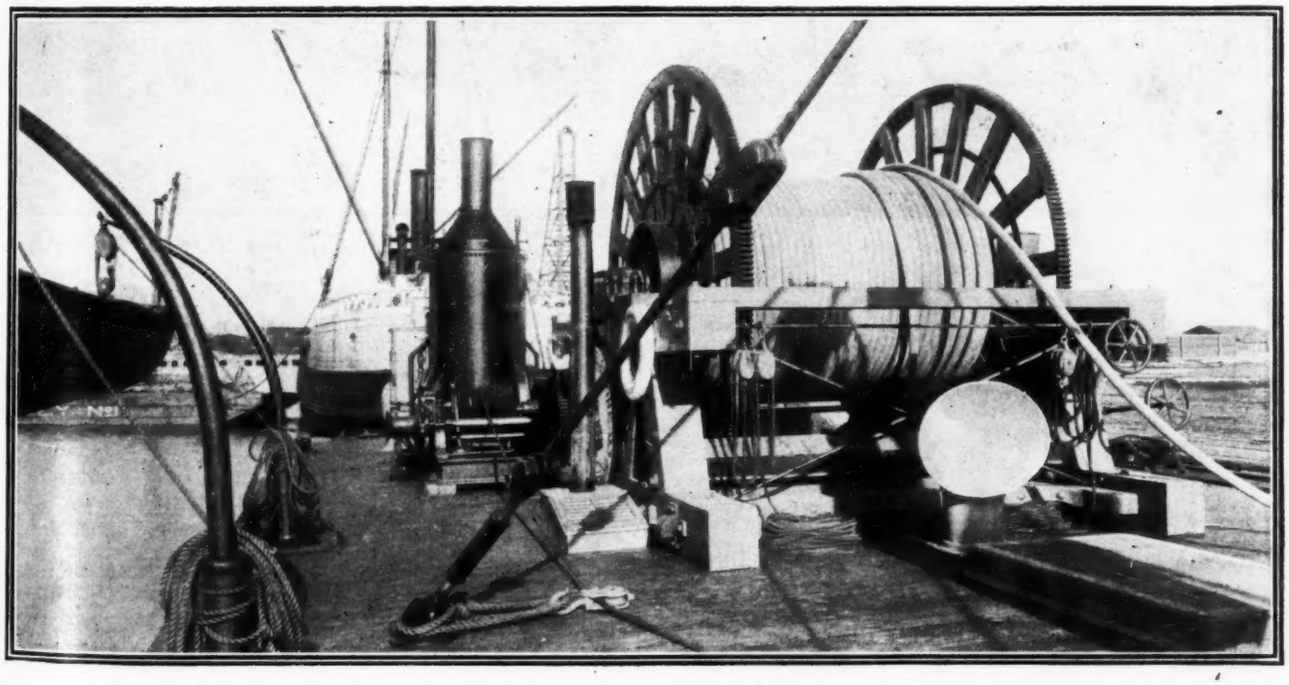
"The barge equipment is the property of the Pacific company and was recently constructed for it on account of the constantly increasing number of cables that are being introduced as part of the telephone system in the bay cities."

The cable was made at Chicago. On account of its size it was necessary to ship it from the Hawthorne works to San Francisco in six sections, three sections each being there spliced into one laying section.

The "Repairman" was especially constructed and equipped for the laying and repairing of submarine cable. The principal dimensions of the "Repairman" are: Length, 70 ft.; breadth (sides amidships), 34 ft.; depth of side moulded, 7 ft. 9 in.; depth at center, 8 ft. 1 in.

The construction was rigidly supervised by a marine architect. Every timber and plank is continuous from end to end, no scarpling having been permitted. The sides and longitudinal bulkheads are of 6-in. material. The bottom planking and decking is of 4-in. material. The bottom is protected by felt and redwood sheeting.

Ample accommodations are provided for the crew. Six end compartments are for storage and work rooms. Two of them are partly occupied by the fresh-water tanks—900 gallons for the engine and 600 gallons for domestic use. The equipment stored can be taken out through the



The Equipment Aboard the Barge "Repairman" for Laying and Repairing Submarine Cable in San Francisco Bay.

hatches as provided, or through the openings, into which ventilator cowls are set when the lighter is not in use.

The dynamo room contains the equipment for lighting, consisting of a 35-volt 1 k. w. generator belt, connected to a 3-horsepower engine. This supplies current at 35 outlets fitted with 27½-volt wire-type Mazda lamps. Outlets are located at various points on deck, from which current may be taken for lights on the dock in the vicinity of the lighter. This engine also operates a 1½-in. steam pump, which is used when steam is in the boiler. In addition, the usual hand pumps as required by the marine regulations are provided.

A testing room adjoining is fitted up for the use of the cable-testers, and will be used by them for testing operations and as a chart and record room. Communication with the shore is always possible through any good cable that is being laid or picked up.

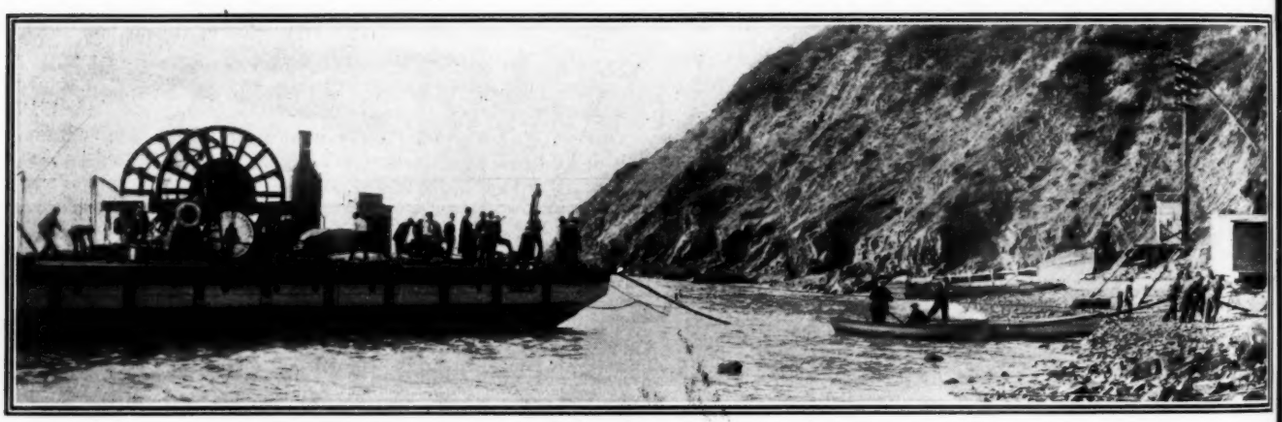
The engine is of a type commonly used for hoisting; steam is supplied by a 48-in. by 8-ft. boiler to two 8-in. by 10-in. cylinders, developing 35 horsepower. This operates the gypsys, hoisting drum and the reel, but by means of several clutches it is so arranged that any part may be operated independently of every other part, resulting in a maximum of efficiency for the amount of machinery.

The capacity of the reel is 10,000 ft. of 3-in. cable, which may have a maximum weight of 85 tons. The paying-out of cable is regulated by two brakes, one on the jack shaft and one on the main shaft, both operated by hand wheels located so that the operator is in full view of the cable.

The derrick, when properly rigged, is capable of lifting 20 tons. The guys are so arranged that should clear deck space forward be required, they may be let down. Eye bolts on deck are provided for blocks for such leads as may be required for hoisting.

The crew consists of a foreman and seven men, which does not include testers, splicers and other workmen who are added as required.

The lighter is equipped with a complete outfit of lines, hawsers, anchors, buoys and tools for every purpose. Two boats are a part of the equipment, one for general use and a life boat carried on davits. In addition an ample supply of life preservers and life rings, together with such other marine apparatus and supplies usually furnished a vessel of this kind, was placed aboard.



Landing of the San Francisco End of the Submarine Cable at Goat Island.

Important Business Transacted by Canadian Convention.

Discussion of the terms of a proposed standard form of agreement for interchange of service between the Bell Telephone Co. and Independent companies, formed the business which occupied most of the time of the seventh annual convention of the Canadian Independent Telephone Association, just held at Toronto, Ont. There was a good attendance at the meeting, 47 companies being represented. B. G. Hubbell and B. L. Moore, of the Federal and Century companies, of Buffalo, N. Y., were also present.

The proposed agreement came before the Dominion Board of Railway Commissioners during the chairmanship of the late Judge Mabee, and the Bell and the Independents have agreed on all except two clauses, which were suggested by Judge Mabee. The Independent people thought that the matter was practically settled, but General Manager Sise, of the Bell company, in a letter recently sent to the Independent association, declined to agree to the clauses as they stand at present. It is also said that he threatened that if the matter is taken before the railway board again his company will refuse to agree to the other clauses, which are said to have been already agreed upon by the counsel of both parties. The convention decided to instruct the association's counsel, H. D. Gamble, K. C. to resubmit the whole matter to the commission.

The disposition of the Independents in the matter, it was pointed out, had been to secure an agreement which would be perfectly fair to both parties, and to make every effort to conciliate rather than to antagonize the Bell Telephone Co.

Some time was given to the discussion of trouble experienced in northern Ontario. P. R. Craven, of New Liskeard, representing the Timiskaming Telephone Co., stated that municipalities in northern Ontario were exacting 3 per cent. of the company's gross receipts for free maintenance of a fire alarm service in return for a franchise, whereas the Bell company, under its Dominion charter, was empowered to enter a town and compete without any hindrance.

On motion of the Timiskaming Telephone Co., the following resolution was adopted:

"Resolved, That this association petition the Ontario government to so amend the telephone act that where an Ontario Independent telephone company cannot arrange terms with a municipality for the use of the streets or roads in the municipality, the matter may be referred to the Ontario Railway and Municipal Board, which shall have jurisdiction to hear both parties and grant permission on what terms it considers fair."

A difficulty has arisen in certain cases where an Independent line terminates on a Bell switchboard and an interchange of service is required, under the Ontario telephone act, with another Independent system. Under the agreement existing at present covering such cases, there is no provision by which the Bell company is compelled to switch the cables to connect the two Independent systems. This difficulty, as it exists at present, renders it necessary for the Ontario railway board to order the Independent company which is affected to install its own switchboard at considerable and unnecessary expense.

(*Continued on page 809.*)

Two Weeks After

Some Post-Mortem Statements — Other Items

By J. C. Kelsey

The most remarkable man in the world has been located. He is Charles D. Hilles.

This young man had charge of President Taft's campaign, and clear up to the last, we heard his cry of victory. I wonder if he realizes what hit him, even unto this day!

The campaign was a funny one. It is time for post mortem study, and for the man who "told you so."

We know more about the silent vote than we did a short time ago. And that there is a new phase to the political situation of the United States.

On the back page of the Hearst papers were articles written by three doughty champions of three political parties.

"Political articles to the right of us, political articles to the left of us, volleyed and thundered!"

George W. Perkins in one column told us what would happen if Mr. Wilson got his hand on the government throttle.

W. G. McAdoo poured out compliments and praise for Wilson, and reminded us how the gentle hand of Mr. Perkins forced Colonel Roosevelt to approve the Tennessee Coal & Iron deal.

But it remained for the Republican Charles Hilles to do the real scare act. Think of it! using obsolete Chinese army tactics at this age!

With hideous masks and frightful cries, the Chinese soldiers rushed at the calmly waiting Japanese army, and it was soon all over save the groans of the dying Chinese!

Right in America, "the land of the free and home of the brave," the people heard Mr. Hilles' ghoulish cries and waited calmly to vote for the adjustment of wrongs which you and I know full well do exist.

Here is his best scare: "Have you got a note in the bank? If so, look out for Mr. Wilson!"

I can not comment upon the true grammatical fitness of this expression. I presume he put in "got" for the benefit of the plain people who are supposed to use superfluous words.

It's curious to study the conception the politician has of the plain people. I asked a prominent politician once if he really believed that the Democrats would ruin the country. He said, "Of course not, but we will make the people believe it anyway."

The thought has occurred to me quite often, how unselfish Democrats are to go right ahead and deliberately vote for the ruin of their business.

In this day of selfish commercialism, it is refreshing to contemplate the utter unselfishness of a Democrat, sacrificing his business for a principle.

You and I know full well that this country is going too fast on some things, and it must be checked. Wool, shoeleather and necessities should be given to the poor a little bit cheaper. Such things as bounties and special privileges must be dispensed with.

If a man can't raise sheep without the aid of the government, let him quit and do something else. It is a poor idea to protect the few at the expense of the many—but it seems to be human nature.

For my part, I fully sympathized with Mr. Wilson when he said he had no notes in the bank. He is lucky. I'll bet you wish you hadn't!

Having a note in the bank does not always indicate business ability, Mr. Hilles! Ten to one it indicates extravagance and waste. I know a man who borrowed $400 to make a first payment on a $2,000 automobile.

Because Mr. Wilson said he had no notes in the bank, Mr. Hilles sagely concluded that Mr. Wilson naturally knew nothing of business.

Mr. Hilles says perhaps Mr. Wilson thinks it a disgrace to have notes in the bank. If he does, I agree with Mr. Wilson that most of the notes are a disgrace, and quite unnecessary.

Everyone knows that money must be borrowed for the conduct of business. That is why most enterprises fail—simply lack of capital.

The narrow line of business success sometimes depends upon whether you discount your bills or float along paying as you can.

As for me, I think Mr. Hilles was desperately anxious for some war material. Mr. Hilles talks as if banks would stop credit and the extension of loans at the drop of a hat. He forgets that a bank has to live.

How else can a bank pay salaries and dividends, if it does not loan money? The men who borrow the money favor the bank—not the reverse.

But the lesson is that people are not longer afraid of false faces and hideous noises. The bank situation does not frighten them. Nor does the big business condition which offsets its increased cost of production by reason of its size by arbitrarily raising its prices.

The people have shown Republicans and Democrats alike that some improvement must be made, that inefficiency of trusts can not be thrust upon the public, and that the punitive arm of the public is not withered.

Political threats, promises and other inducements or objections have lost their sting. The political parties have their lesson. They will be measured solely on their deeds!

The increasing power of the public is going to be felt more and more. We have that shown by the various state commissions, and by the power of the state to call for all data.

We have seen state constitutions changed to suit the tendency of the people to localize their power.

The railroads seem to be the chosen victim these days.

Arizona created a state commission to see that corporations and the people get equal justice, thus preventing hasty and ill-considered action. Then the legislature turned right around and is going to do this:

1. Regulate the number of men employed on engines and trains.
2. Regulate headlights.
3. Eligibility of train and engine-men.
4. Limiting number of cars on trains.
5. Regulate rates.
6. Pay day every two weeks, etc.

I wonder just what the state of Arizona expects to leave to the jurisdiction of her commissions? It certainly leaves them doing little but causing depots to be built and drawing their pay.

I can not help but feel sorry for railroads, but they have brought it upon themselves. The only excuse or defense they have left is the innocent investor, and the workingman.

I heard of an incident the other day, which was manifestly unfair to the railroad—99 men out of 100 would have made the change.

A government attorney purchased a sleeping car ticket from Odgen to Seattle. At Portland he was asked to transfer to another sleeper for Seattle. He refused to do so, and in answer to the railway's plea "to be reasonable" he merely demand his rights.

The railroad had nothing to do but put on that same sleeper and the government attorney rode all night by himself.

What is the lesson from this? It tells us that there is a new power in the land—that it is recognized, too. A few years ago, a few burly switchmen would have pitched that attorney headlong from the car, and there would have been no redress.

You can see how the pendulum is swinging the other way. The Interstate Commerce Commission has even prohibited engineers from tinkering around their engines when off duty. When I was trying to be a fireman, the engineer could not be restrained from repairing his own engine.

The theory of the Interstate Commerce Commission is that engineers must rest. It conflicts with the 16 hour law.

This law does protect the public at least from enginemen asleep at their posts. A sleepy man can not be kept awake, even if his life depends upon it. Yet it seems strange that an engineer can not help to put his engine in order. Such an order could be termed "a garage act."

Commissions must be above politics, if corporations and public are to receive equal chances.

The pattern to follow is the Dominion Railway Board of Canada. Each member is appointed for life. It is relatively easy for men in such positions to deal squarely, fairly and fearlessly.

American institutions have far to go before they reach the fair standard achieved by Canada.

I am not one who decries his own country. But I certainly believe in taking beneficial lessons from others.

Another indication of social and industrial justice is the determination of the American Telephone to adopt a pension system. While such a scheme may have selfish aspects, and it may be repugnant to American ideas, it is a recognition of the rights of the workers.

If a man plants a tree, he certainly should be entitled to some of its fruits. If a man gives the best part of his life, helping to build up a successful institution, he certainly has a right to some of the fruits of his work.

I often have heard a man say he would not take a pension from the government as long as he was able to work. But I know of no man who has refused his old age pension.

There can be lots of abuse of a pension system. It is hard to discharge men who have grown old in the service. But it has to be done.

Men are shifted around so much and are unable to save any money. A pension system is the only answer.

The rights of the individual who has been injured in the performance of duty have been more fully recognized.

Nothing ever was so insidious or devilish as the fellow-servant act—it defeated its own ends by its contemptible and utter selfishness.

Years ago, I fell forty feet, because of a defective cross-arm put on carelessly by a shiftless employe. I was hurt at 10:30 a. m. Yet, to this day, the company has never paid me for that 3½ hours.

My fellow employes were not allowed to see me at the hospital where I suffered cruelly for fourteen weeks. I was denied any assistance whatever. I had no rights. My only relief would have been a torch or something of an anarchistic nature.

Today you find a different feeling. Corporations anticipate accidents and expect to pay for them.

I like the Wilson idea that no honest business need fear interference. That is the keynote of the modern idea of social and industrial justice.

Naturally, some people will object to the lowering of tariff on the grounds of disturbing business. When John Adams and his friends dumped the tea into the harbor, the Boston business men implored him to desist because a war would hurt business.

A vote against the saloon is objected to by some men because it will hurt their business. Cihcago is talking segregation of vice today. You would be surprised at the number of groceries, saloons, laundries and other business enterprises that have shown themselves favoring segregation. It helps their business!

I have never seen anyone who really benefited by an abnormally high tariff, except a few clothing manufacturers. Every one of these fellows is getting rich by the abnormal conditions of the tariff. Yet you never saw anything more pitiful than the clothing strikers' parade—poor, pitiful, starved and underpaid workers, men and women, shivered in the streets, showing their wrongs to Chicago.

Yet this very work is protected to death. Why don't the workers share in it? That is the question!

Something is wrong somewhere. The same condition applies to the mill workers of New England and the south. The poorest paid employes are those of a highest-protected industry. It's queer! It is our unsolved anomaly.

I look upon the Independent telephone movement as the real pioneer of this era of industrial justice. It broke the ice!

You surely remember the cause of the birth of Independent telephony! It was born of necessity! And it possibly went beyond the actualities of necessity. Yet I believe the first blow was struck by this industry.

Here is the way it did it. The Independent company was made up of the lawyer, doctor, grocer and dry goods man. They banded themselves together in a public utility business, and undertook to give a needed telephone service. They clashed with a very wealthy corporation, which gave no quarter and whose confidence knew no bounds.

The Independents succeeded in bring this haughty concern to its knees. And each businessman in that company lost his over-respect for the ever-weening power of big companies.

The country business man once looked upon big business as something sacred, and savoring of a higher law. Today he knows that big business has as much cause for timidity as he has.

When people had succeeded so signally in telephones

some more dared to contest with steam railroads. And they gave us the interurban.

The interurban electric railway is an exact counterpart of our Independent telephone. They started out on a low-rate basis, too. And many of them went into disaster. But the germ of success was there just the same.

These industries may be classed as "business rebellions" in which individuals banded themselves to enter occupations or industries formerly held as monopolies.

In Canada, we have something fairly the same, in which the governments went into the telephone business.

The enemies of government ownership the Winnipeg Telegram characterizes as those preferring to tip their hats to a monopolist millionaire than to own and run their own business themselves.

Lots of people here feel that the Bell company should have the telephone business to itself on this very basis.

Let no man engaged in honest business have any fear. That is an excellent idea and augurs well. Any man who objects to this is in the class that flee when no one pursues.

I sincerely hope that the defects of the Sherman law will be patched up. I hope we may see the day when no concern can charge more at one place to defeat competition in another place.

I heard a man calling this a broad view of telephone rates—to allow a company to charge high prices because it lost in competition elsewhere!

That is the dangerous idea—to charge more to those unprotected by competition than those who have it. It is surely putting a high premium on the benefit of competition.

Competition can be fairly carried on without ruin or loss to deserving institutions. The only people dreading competition are those economically and technically unfit to meet its demands.

Competition at least gives us survival of the fit—it sifts the unfit and the incompetent.

No man enters a Marathon without intelligent preparation. Neither can any business enterprise hope to enter the great Marathon without special fitness.

If they can not live without special privilege, let them die, or kill them at birth!

MORAL: Don't be frightened by false faces!

Operators' School to be Held at Bloomington.

W. S. Vivian, who has specialized in the conduct of schools of instruction for toll operators, has agreed to go Bloomington, Ill., next month and hold a school there. It has been demonstrated that this method of bringing together the operators from territories in which they continually work together, thereby making them personally acquainted, has invariably resulted in a high degree of improvement and the comprehensive working out of uniform operating methods. The Bloomington school will be held on December 10 and 11.

Service Association Traffic Committee Completed.

This week J. W. Callahan, general manager of the Illinois Telephone & Telegraph Co., of Chicago, and president of the new Central States Telephone Service Association, completed the traffic committee of that body by the appointment of W. J. Uhl, secretary and manager of the Logansport (Ind.) Home Telephone Co., and J. C. Casey, of the Kinloch Telephone Co., St. Louis. F. L. Eldridge, special agent of the Illinois company, and assistant secretary of the association, becomes, ex-officio, a fourth member of the traffic committee. The chairman is W. S. Vivian, of Grand Rapids.

Now that the organization is completed, it is expected that the committee will at once plunge into active work for the benefit of the members of the association. With the exception of Mr. Uhl, all were members of the committee which did splendid service in drawing up the association's operating rules.

Telephone Lines in the Texas Oil Fields.

In Texas in the vicinity of Beaumont are many oil wells. Telephone communication between the various wells of a company is quite essential and one of the companies, The Gulf Pipe Line Co., has quite an extensive telephone system.

W. G. Maupin recently sent TELEPHONY an interesting photograph showing the derricks over the oil wells and

Telephone Line Among the Oil Well Derricks.

a view of the telephone line. The company has had considerable trouble in the oil fields with its lines due to timbers and guys falling from the derricks. Several times the line has been moved to permit the driving of new wells. During a recent storm five derricks were blown over taking the telephone line with them.

Service Association Committee to Meet.

A meeting of the executive committee of the Central States Telephone Service Association has been called for next Tuesday, at 10 a. m., in the office of J. W. Callahan, president of the association, 162 West Monroe street, Chicago. This meeting is called for the purpose of establishing a policy to be followed in connection with the work of the association. Other matters of importance will also be discussed.

Telephony in Japan.

Arrangements are said to be in hand for the establishment of a wireless telephone service between Tokio and Yokohama according to an item in the Electrical Review of London.

There are now 4,100 telephones in use in Yokohama, and owing to the steady increase, it is proposed to establish, next year, a new exchange in the suburbs of the city.

Proceedings Before Commissions, Courts and Councils

Discussions and Rulings of State Bodies Having Supervision of Telephone Companies, Decisions of Courts in Matters Affecting Public Relations of Utilities, and Actions of City Councils Bearing Upon Franchises, Rates and Service

Supreme Court Sustains Competitive Principle.

A decision just handed down by the United States Supreme Court, to the effect that it was not necessary to hear arguments in favor of the constitutionality of the South Dakota "unfair sales" law, says a Washington dispatch, is taken as an indorsement by the highest tribunal in the land of the constitutionality of the plan of President-elect Woodrow Wilson to destroy unfair competition in the nation.

In his campaign for the presidency, Governor Wilson advocated a federal statute that would send monopolists to jail for underselling rivals in order to drive them out of business. The decision today is in support of a state law that makes it a crime to sell a commodity in one community cheaper than in another with the intent to destroy competition.

The refusal of the supreme court to hear arguments in favor of the constitutionality of the law came after the attorneys for the Central Lumber Co. had attacked the anti-monopolistic statute. The action is construed as equivalent to a decision in support of the law.

The decision will be as far-reaching even as the construction of the constitutionality of a state law, because, in addition to South Dakota, North Dakota, Kansas, Michigan, Iowa, Minnesota, Nebraska, Oklahoma and Tennessee have laws very similiar to the one ruled upon.

In several of his speeches Governor Wilson pointed out that the way to prevent big business from throttling small business in the natural home market of the smaller concern was to prevent the big business from making it impossible for the little fellow to live by underselling him in his home market and keeping up the price outside.

In the Standard Oil and American Tobacco suits it was shown this was one of the most favored methods of the trust for crushing the independent. He was undersold in his own home market at every turn until he was ruined and competition made impossible. When his business had been destroyed the prices were advanced.

This was the method by which the beef trust operated in the driving to the wall the small butcher, who did his own killing, with the result that meat is higher today than at any time since the civil war.

It was with a full knowledge of these conditions that Governor Wilson in his speeches at Wheeling, W. Va., Kansas City, Mo., and Rochester, N. Y., talked of his plan to have a federal law to protect the small manufacturer in his home market. At Wheeling he said:

"We should have a federal law which would provide that those who build up monopolies and commit the criminal offense against fair competition should have time to think it over in some building from which they will not for some time come out."

Utilities Commission Created in Oregon.

The Railroad Commission of Oregon has just been given jurisdiction over all public utilities in that state by a new law which was passed at the regular election on November 5, which extended the authority of the commission from railroads alone to all utilities. The bill was carried by a a majority of about 6,000. Because of the fact that the bill will go into effect immediately, and in order that they may be able to take up the additional duties now placed in their hands, as soon as possible, the present members of the railroad commission will proceed at once to familiarize themselves with the new work.

The main features of this bill are taken from the Wisconsin Public Utilities Act, as it was first passed by the Oregon legislature at its regular session in the spring of 1911.

The Railroad Commission is now vested with the power and jurisdiction of supervising and regulating all public utilities in the state of Oregon. The new bill requires adequate service and reasonable rates, common using of certain facilities and compensation therefor, valuation of properties, uniform accounting and reports. All rates, tolls and charges shown on schedules of tariffs, which are filed with the commission, shall not exceed the rates, tolls and charges in force on January 1, 1911.

The commission, in addition to its other powers, is also given the powers for investigations, hearings, etc., similar to those given other state commissions, and appeals can be made to the various state circuit courts and from there to the supreme court of the state. The commission is also vested with the authority to investigate accidents.

The present members of the railroad commission which has been in existence for several years, are C. B. Aitchison, chairman; Thomas K. Campbell and Frank J. Miller. Its offices are at Salem, Oregon.

Reporting and reviewing the conversion of the commission's powers into a wider scope, the Journal of Electricity, Power & Gas says, editorially, in part:

"The new bill does not contain the indeterminate franchise provision. This omission may prove the better part of judgment. A recent decision of the circuit court of Dane county, Wisconsin, holds, in what is known as the Appleton waterworks case, that, in fixing the price which a city is to pay for the purchasing of a utility, the Railroad Commission must add a value for the indeterminate franchise.

Most recent evolution in utility appraisal practically is unanimous that a franchise for which nothing is paid has no value for rate fixing purposes. If the principle upheld in the above mentioned Wisconsin circuit court stands the supreme test, the value of the indeterminate franchise theory may be materially impaired.

The review feature is also missing from the Oregon law. In California a review of the commission's decisions may be taken directly to the state supreme court, without the delay and uncertainty attendant upon a retrial in inferior courts, with a final appeal to the state supreme court. It is regretted that this feature has been omitted.

Summing up, however, all the various clauses in the new commission law of Oregon it would seem that this commonwealth is to be congratulated in having a good, workable enactment."

Revive Talk of Merger in Indianapolis.

Steps are again being taken to agitate a merger of the two telephone companies in Indianapolis. C. A. Schrader, of the board of works, is particularly active in getting the proposition onto a working basis. He proposes to have the board of works act as an arbitration board and settle all disputes which may arise between the company and the public.

It is planned to have the Central Union abrogate its present rights in the city and operate the merged companies under the franchise of the Indianapolis Telephone Co.

Indiana Public Service Bills Being Drawn.

The Indiana legislature convenes the first week in January. Already a number of public utilities bills have been prepared and submited to the reference law librarian for his correction and approval.

Merger at Oakland, Cal., to be Fought.

With the object of preventing the Pacific Telephone & Telegraph Co. from proceeding with the dismantling of the plant of the Home Telephone Co. at Oakland, Cal., suit has been filed by Redmond C. Staats, city attorney, of Berkeley, in the superior court against the corporation in a final effort to block the merger of the two companies. Of primary importance in the suit is the request for an injunction to prevent the Pacific company from further work in the removal of poles and the tearing down of wires.

The complaint sets forth the fact that the city will be damaged by the removal of the poles, inasmuch as the wires for the police and fire alarm signals are strung on them and the municipality would be compelled to incur expense in placing new poles.

The contention is made that the merger is illegal because it is in violation of the franchise granted by the city. One of the provisions of the franchise is that the holder cannot sell to another telephone company which was in existence in the local field when the franchise was granted without the consent of the city. A second provision, more vital than the other, is that six months before the expiration of the company's franchise, the municipality shall have the first option on the property, the price to be settled by representatives from both sides. This clause has also been disregarded, it is alleged.

If Staats is not successful in this suit, further proceedings will be instituted in the courts at once. At the time the franchise was granted to the Home company the corporation furnished a bond of $25,000 to guarantee service. Proceedings will be started to force the company to make good this amount because the franchise has been violated.

Utilities Commission Opens Chicago Hearings.

The public utilities commission, appointed by the Illinois legislature, which will frame a bill for the control of public utility corporations, began public hearings at the Hotel La Salle, in Chicago, on Thursday. Hearings are public and the commission expects to remain in session a week at least. Senator Dailey, of Peoria, is chairman.

"The commission planned to visit the larger cities of northern Illinois," said Chairman Dailey, "but it has been unable to do so. An invitation is therefore extended to the mayors and the city councils of these cities to appear at Chicago.

"The resolution creating the commission authorized it to extend its investigation to persons, firms, or corporations engaged in furnishing the public with the following kinds of service: Gas, electricity, water, heat, power, telephone, telegraph, subways, conduits, tunnels, docks, and wharves.

"The members of the commission have given these questions the most careful and painstaking study for eighteen months and we expect the sessions in Chicago to be most instructive."

Mayer Stein, attorney for the commission, will be present to question the voluntary witnesses who may appear fore that body.

Physical Merger Completed in Pasadena, Cal.

The consolidation of the Pacific Telephone & Telegraph Co. with the Home Telephone Co. at Pasadena, Cal., has now been effected.

All subscribers of the two companies are now connected in a single system. The merger affects 10,000 telephone users.

The system which now controls the Pasadena field is owned by the Pacific Telegraph & Telephone Co., although operating under the name of the Home company. Strict rules regarding efficient service and giving the choice of the two long distance lines to all telephone subscribers are features of the change.

Municipal ownership of telephones in Pasadena is made possible through an agreement with the city at the time permission was granted to the Pacific company to consolidate with the Home. Under the terms laid down by the city the telephone properties can be taken over by the municipality at any time.

Hearing on Hendersonville, N. C., Rates Next Week.

November 29 is named by the North Carolina Corporation Commission as the date for a complete hearing, at Raleigh, of the Hendersonville telephone case. The Asheville Telephone Co. proposes to advance the Hendersonville local rates on account of improvements and the largely increased number of subscribers.

Municipal Ownership of Telephones.

The Mountain States Monitor reprints the following from the Epraim Enterprise:

"Died, of general debility, about 10 o'clock Tuesday night, the Ephraim municipal telephone proposition. Deceased had a host of admirers in this community who will be shocked by the report of his sudden taking off. The obsequies were held immediately after the patient had suffered his last convulsion, and with impressive ceremonies the corpse was laid beneath the graveyard daisies. The speakers were Mayor P. D. Jensen, the members of the city council, and Senator L. M. Olson.

As Seattle Times Sees Municipal Construction Gang.

In accordance with the wishes of those who so fondly watched over the patient during his last illness, who were present when he shuffled off, there were no flowers and all music was dispensed with. The mourners were comforted, however, with the assurance that the city administration does not desire the total extinction of life but merely a peaceful slumber until the dawn of a brighter day."

In this connection the accompanying cartoon, from the Seattle Times, is interesting.

San Francisco Ordinance To Reduce Bell Rates.

As stated in TELEPHONY, there will shortly be submitted to the voters of San Francisco an ordinance effecting a material reduction in the rates of the Pacific Telephone & Telegraph Co. in that city. This will be done under the initiative provision of the city charter, which gives both the council and the people the right to regulate the rates of a public utility corporation.

(*Continued on page* 807.)

Practical Telephony for the Practical Exchange Manager

A Series of Articles Relating to the Construction, Maintenance and Operation of a Moderate Size Telephone Exchange, Which Began in the Issue of September 21 — Further Discussion of the Magneto and Common Battery Systems and Equipment

By H. R. Van Deventer

ADVANTAGES OF THE TWO SYSTEMS.

One point from a service standpoint, should be remembered, the common battery system does not possess any great advantage over the magneto in point of operating speed. (This applies only to small non-multiple boards with one or two operators.) The operating speed depends upon the proficiency of the operator far more than the equipment placed before her. In the magneto system, the subscriber is obliged to turn the generator crank when calling, whereas in the common battery system it is only necessary to remove the receiver from the hook. In either case the subscriber is obliged to wait until the operator answers. If the operator is properly trained, in either system, she will plug into the line jack almost before the subscriber has the receiver to his ear.

The great advantage of the common battery system from a service standpoint is the automatic disconnect signal; the simplicity of the instrument, especially the desk set; the uniformity of the battery supply, which is the same for all stations; and the lessening of the operators' work by reason of lamp supervision which is automatically controlled by the insertion and withdrawal of the plugs. Many of the advantages in the magneto system are from the standpoint of the telephone company. Subscribers can and should be made to see them, and to realize that the advantages of the common battery system can only be had in a small exchange at an increased cost.

Where common battery is used, the construction should be of the highest quality. No individual line should, to insure standard transmission, exceed 750 ohms resistance, with a 24-volt system. Trees must be trimmed absolutely clear of the lines, much more so than with the magneto system. If a magneto line goes down in the mud, it will often continue workable; at least some sort of service can be given. With common battery, under these conditions, a permanent signal on the switchboard would result, and the line would be out of service until the necessary repairs could be made.

In any small common battery exchange, the country and toll lines, which must be magneto, form quite a respectable portion of the whole. As these must have magneto cords and line signals, some of the lines in any event must be magneto, and the switchboard is complicated by the equipment necessary to handle both magneto and common battery lines. In big common battery boards this situation is easily handled by putting the magneto lines on a position equipped for handling them. On a small board, this is obviously impossible.

As to the transmission, magneto telephones talk the best, but the older the batteries which are used, the poorer the transmission becomes. It is seldom that a magneto system reaches the maximum of its possible efficiency. The common battery system is within a few per cent., say 95, of being as efficient as the magneto, and is always so, regardless of the length of time a conversation lasts. With the magneto system, the batteries in the telephones must be renewed, probably on an average once a year. The common battery telephones require no batteries at the subscriber's station, all current being supplied from the central office. On the other hand, the common battery system requires a storage battery and no other kind will do. This battery requires charging, and must have expert care.

A higher grade of men must be employed with the common battery system. The switchboard is necessarily more complicated and requires more care. The instruments, however, are more simple.

SOME COST COMPARISONS.

From the cost standpoint there is some difference between the systems. One manufacturer furnishes the following figures as typical of the annual charge basis for a 300 line system:

"A common battery switchboard costs $500 more than a magneto board. At 6 per cent. annual interest on this amount is	$ 30.00
Assuming 15 years' useful life for the board, the excess depreciation will be 6 2-3 per cent. per year on $500, or	33.30
Current consumption will be 755.55 kilowatt hours, at 6 cents per kilowatt hour	45.33
Total excess expense involved by common battery equipment over magneto	$108.63
The cost of 300 magneto telephones is about $550 more than 300 common battery telephones. At 6 per cent. the interest on this is	$ 33.00
Assuming 15 years useful life for these telephones, the excess depreciation charge will be 6 2-3 per cent. on $550, or	36.63
The expense for dry cells with the magneto system, assuming a new set per telephone every 9 months, a total of 750 cells per year at 16½ cents per cell, is	123.75
The labor installing the cells, assuming one trip to each telephone every 9 months or 1¼ trips per year, 2 hours' time per trip, with labor at 25 cents per hour, amounts to	187.50
On hand generators costing $3 each, $900 for the lot. the depreciation at 5 per cent. per year, comes to	45.00
Total excess expense involved by magneto system over the common battery	$425.88

The lines in either system are considered the same, as to expense."

These figures show a saving of $317.25 per year by using common battery, or $1.05 per telephone.

The common battery system shows a saving, according to the foregoing figures, but there are other factors which must be carefully considered. While a magneto system may be installed and operated by a man having but slight knowledge of telephone work, the common battery must be properly installed by a trained man of experience, and thereafter requires more or less expert care. Should the inexperienced man make some mistakes with the magneto system, probably but little damage would result, especially to the switchboard. With common battery mistakes are costly, as they may permanently damage the equipment.

For a source of current supply, with a common battery board, a storage battery is necessary. This must have careful care. The attention required can easily be learned by a careful study of the instructions sent with the battery, but it seems that only a trained man will follow these instructions. Then there are things that happen to a battery which the instructions do not seem to cover and where experience is the only teacher. The fact of the ever present storage battery should be carefully reckoned when considering the common battery equipment.

A storage battery must be charged regularly. The regu-

lar lead and acid types will be damaged if left discharged for any length of time. This necessitates a source of direct current, which the average small town does not possess. Most towns now have alternating and this must be converted to direct current before it can be used. The device ordinarily used for doing this is called a "rectifier." It is furnished in several types, practically all of which require careful maintenance.

Various Types of Rectiffiers.

Usually in small exchanges, a single set of storage cells is used. As the charging, without expensive equipment, causes some noise on the lines, it should be done at night, preferably between midnight and 4 a. m. For the small exchange, having an alternating current supply, several forms of rectifiers are available. The chemical type is simple, and probably is more nearly fool-proof than any other. It is, however, troublesome to maintain the chemicals in good condition, and is very noisy, that is, its operation causes noise on the switchboard.

The mechanical vibrator type of rectifier can be used in very small plants, when the charging current does not exceed a few amperes. It is easy to keep in adjustment, but also causes noise on the board when in operation.

The rotary converter is simply an alternating current motor with another winding and commutator on the same shaft so that direct current is obtained. Sometimes it is in the form of a motor driving the generator, the two being belted or coupled together. This is called a motor-generator set. It requires but little maintenance and is practically noiseless when in operation.

The mercury arc rectifier is a mercury vapor tube, with certain auxiliary apparatus. It is a satisfactory and noiseless outfit, but requires careful, intelligent, handling on the part of the exchange employes.

The chemical rectifier is the cheapest and least efficient; the mechanical type is next in cost and efficiency; the rotary converter follows in efficiency, while the mercury arc

Things Happen that the Instructions Do Not Fit.

rectifier is probably the most efficient. The rotary converter costs less than the mercury arc for small units, while for large outfits the rotary converter is higher.

Another source of direct current energy is the combination of a small gasolene engine and dynamo. This enables the battery to be charged at any time, and makes the telephone plant independent of the outside supply for power. A gasolene outfit should be carefully chosen. If a very small outfit is required the engine may be arranged so that it can be disconnected from the dynamo and used for other

Storage Batteries Require Fresh Water Occasionally.

purposes. The dynamo should be of the three bearing, heavy fly wheel type, and should be arranged to run slack under the belt. This will result in even, noiseless, charging. The dynamo should be of suitable voltage and amperage to charge the battery with which it is to be used. An old 110 volt machine, such as is often picked up for this purpose, will not do, and such make-shifts should be avoided.

While storage batteries require fresh water occasionally, do not "dope" them too much. The water must be pure. Water containing iron, various salts, vegetable matter, etc., will spoil the battery in a short time. A sample of the water should be sent the battery manufacturers for analysis, and if not satisfactory, distilled water should be used. This costs money, and the cost should be estimated in the maintenance charge.

The battery cannot be installed in the same room with the switchboard or terminal apparatus unless placed in a gas-tight closet having a good sized opening to the outer air. This closet should be coated inside with asphaltum paint, and have all nails and screws carefully covered with pitch and painted. Every part of the cells should be accessible for examination and repair. Usually 11 cells are employed and a closet 4 ft. wide, 7 ft. long and 6 ft. high is large enough to accommodate the battery for an exchange of several hundred lines.

In many small exchanges the battery, charging apparatus, terminal equipment and switchboard are all placed in the same room. Care must be taken to arrange the battery charging apparatus so that it will not be annoying to the operator. In the case of machines, this is easily accomplished by setting the slate bases on the halves of some solid rubber balls, such as children use for toys, the balls being placed on a substantial platform supported near or on the side walls of the building. The cost of such a platform will rarely exceed $15.

In case the gas engine is used, it should be placed on the ground floor, and a muffling arrangement employed to deaden the noise of the exhaust, which will otherwise be very objectionable. The sum of $10 usually will cover the cost of this arrangement.

(To be continued.)

Practical Subjects—Letters and Discussions

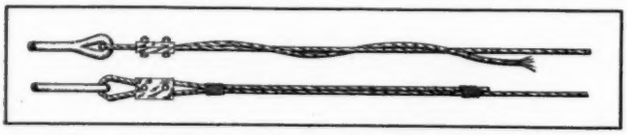
Letters From a Retired Lineman to His Nephew.

Podunk Valley Farm.

Dear Nephew:

I guess to counterbalance your elation over being appointed straw boss, the news that the brindle calf was mired in the slough and lost most of his hair and ambition, will not come amiss. I guess he will make a nubbin of a critter yet.

Now that you have been given a very slight amount of authority, you will find how difficult it is to keep the men from throwing scraps or wire into fence corners, out into



Wrong and Right Methods of Sewing Up Guy Tails.

the road or the fields. You will also have an opportunity to learn how essential it is to prevent such things. A piece of wire can do more kinds of damage than a cyclone and seemingly never completes its job. It can put a mowing machine out of commission, and after being cast aside from that, effectually cripple a horse for life. A hog is supposed to be impervious to most things that affect other kinds of stock, but I recall a case where a hog became tangled with a piece of guy wire and as the farmer said, "worried himself to death." The appraisers fixed the value of the animal at $16.

As straw boss your duties and responsibilities are not defined by any fixed line; they kind of lap over in all directions. You'll have to take the blame for most everything that goes wrong and let some other fellow have the credit for what goes right. You'll have a chance to see that all the little details are attended to properly. Neglect of details not only affects the appearance and efficiency of the line, but sometimes brings about direful results.

I knew of a case where an unserved guy tail disemboweled a two-year old colt. The same condition at the pole end of another guy resulted in badly lacerating a lineman's cheek and spoiling the sight of one eye.

Never leave a hole uncovered where there is the least chance of some person or animal falling into it. I remember one time that we left two anchor holes open in the corner of a pasture, and only over night at that. These holes served as deadfalls for a horse, a hog, and a sheep. It seems to me that it would be a good lesson to employes if the telephone and telegraph companies would publish the details of their damage cases. As it is, only those directly interested learn the lesson. In another instance a broken insulator crippled a horse so badly that he had to be shot. There ought to be a law compelling gangs to bury broken glass or carry it away with them.

As you say, you won't be long enough in a place to get much acquainted, but just enough so that the company finds that the foundation of its reputation depends upon the gang. But leaving the company out of it, the experience, outside of the work, will be mostly amusing to look back upon. There is always a chance of your getting held up by bad weather, by shortage of material or something else, and then again you may have to turn back and go over the ground a second time, so it's well to leave a pretty clean trail. You are never quite as hungry as when you know you can't get anything to eat. There were miles of country which we passed through, where we couldn't have gone back and got as much as a meat rind, let alone a square meal, that is as a gang; but there were some of us, as individuals, who came through with a little higher standing.

I remember one time when I was sent back 40 miles for some reason or other. I found out a good many things I didn't know before about the habits of the men, but that isn't worth trying to remember now. I also met up with a joke which I have never forgotten.

At one place along the road was a farmer named O'Brien. He had a son Ted, who was an idle, apparently good for nothing sort of a chap about sixteen or thereabouts. On my way back I saw the boy sitting in the shade in front of the house, although he should have been out in the field with the men. I called to him and asked if he wasn't afraid the "fool killer" would get him if he happened along.

He kind of roused up and after considering a minute replied: "If you see him coming, you better try to get in somewhere out of sight." Upon a hasty estimate I had misjudged the boy considerably, and I've always been careful ever since to take plenty of time before forming an opinion of a man. I'd advise you to be careful in judging the ability of new men who join the gang. The fool killer may not be looking for them but for you.

Always bear in mind that some one may remember who built the line you are working on. A couple of years from now it may be all lopsided or at least a good many of the poles may lean. You'd hate to go back yourself and find it that way. The only thing you can do is to do all possible to prevent it. See that every pole is tamped thoroughly, even the banking should receive more than a gentle pat with the shovel. Anchor holes should receive the same attention. If the tamping is properly done in the first place, a line will stand for a good many years under ordinary conditions. See that all holes are large enough so that tamps can be used to advantage.

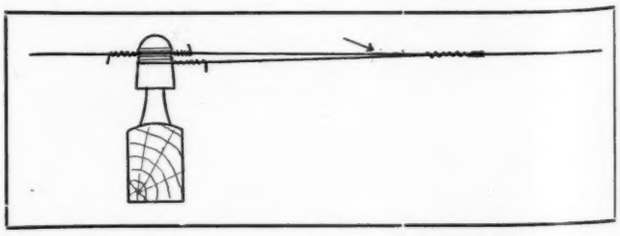
You must have been celebrating real often of late. I am enclosing the $20 you asked for and will keep my eye open for a place to invest that amount in the near future. The brindle calf is coming along better than I expected. Julia takes considerable interest in him and he gets all the morsels which appeal to critters' appetites.

Your Uncle Dick.

Method of Cutting in a Test Station Without Blocks.

This method is applicable wherever it is permissible to use Western Union joints. For each conductor to be opened, take about three feet of wire. After making sure that the tie wire will hold the strain when the line is cut, dead end the short wire to the insulator underneath the line wire. Half tap the free end of the short wire to the line, being careful to keep it free of slack. At this time the line will appear as shown in the figure.

Now cut the line at the point indicated by the arrow and get your test. Then half tap the end of the line which



Arrangement for Cutting in Test Station.

is tied to the insulator, onto the short piece. After cutting the temporary work loose from the glass, finish and solder both joints.

By careful attention to the location and security of the tie wire, it is practicable to get a test and yet introduce very little slack in the line.

B. Yore.

Rise of a Rural Telephone Company in Northern Ohio.

First stage: About 1880. A little country village, new railroad built about a mile away, with a depot; a clerk in the village store who had been a telegraph operator; the building of a telegraph line from the store to the depot; a charge of five cents per message to the public, the line having been built by a private citizen.

Second stage: About 20 years ago the substitution of telephones for telegraph instruments (the clerk in the meantime having set up in business for himself in the same village), and the purchasing of telephones by the merchant and the village physician for their homes.

Third stage: In 1897 a long distance line built through the village and a toll station put in.

Fourth stage: About 1901 three farmers, some three miles from the village, built a line connecting their houses only.. The next year four more built a line. A combined telephone and switchboard was put into a farmhouse and a line built to connect with the village store. The switchboard consisted of three jacks and a cord with a plug at each end installed in the store. The merchant did the switching without charge.

Fifth stage: Farmers' lines extended, bridging telephones substituted for series and lines made full metallic. Ten drop switchboard installed in the store; farmers' switchboard cut out and another line built to central; more farmers' lines built; more lines in the village; new subscribers charged a fee of $5 for privilege of connecting with switchboard. The merchant charged an annual fee of $2 per subscriber for attending the switchboard, but with no good way of enforcing collection. No night or Sunday service, except as the principal lines were left connected; ordinary service when the merchant or his clerk was not busy otherwise. All line work done by farmers, one of whom, becoming better qualified than the rest, became the general lineman. All poles native, all wires galvanized fence wire. Most of the subscribers joined in forming an association, which had no legal standing.

Sixth stage: 1905. A mile of poles were replaced by cedar and an assessment of $4 each made upon the members. Several were delinquent; there was no way to enforce payment and there was a debt. More farmers wanted telephones, but the switchboard had no more room. Better service was desired. Long distance service had improved so that night and Sunday toll service were demanded.

By the carelessness of the workmen when the wires were being transferred to the new poles a carriage containing two ladies was overturned. The first poles set were becoming weak and likely to break off and let wires down across the road and cause other accidents. Any individual owning an interest in the pole or wire causing an accident might be sued for damage. The president of the association objected to serving any longer on account of such a possibility.

Seventh stage: In April, 1906, 400 native poles, 40 cedar, 27 miles of circuit, 52 subscribers. A company incorporated, with 50 of the subscribers as stockholders, each assigning his equity in the lines to the company in exchange for a share of stock of a par value of $35 and each to own his telephone. By-laws provided for dividing the stockholders into eight groups and electing a director from each group; that a number of persons might join in building a line and connecting with the central station, assigning their interest to the company and taking stock, as did the first members, and paying a membership fee of $5. An annual rental of $8 obtained for stockholders and $12 for others.

Eighth stage: Condition on July 1, 1912. A regular exchange, with modern switchboard, 29 drops in use; all-day service seven days in the week, emergency service after bedtime; pole changer; three toll line connections; free service with eight other farmers' exchanges (obtained by building a $100 toll line); 176 subscribers, 43 miles of poles (23 cedar and 20 native), 85 miles of circuit (24 of fence wire), 77 shares of stock owned by 75 persons; an experience in purchasing and building, ranging from small 20-ft. cedar poles at 60 cents and black ash poles at 50 cents, to 20-ft. five-inch cedar poles at $1, and, for three years past, 25-ft. five-inch cedar poles at $1. Construction and trouble work looked after by two farmers at 22½ cents per hour and no livery bills; no officers but secretary and treasurer receiving compensation; each director a collector for his territory; debt (a floating one), reduced from $900 to $300; originating a toll business of $300 a year. There are only eight telephones which could be considered business and their rate is no higher than the others.

Following is the balance sheet at the close of the last fiscal year:

BALANCE SHEET.
As of July 1, 1912.

ASSETS.

Cost of equipment and fixtures		$4,000
Cash on hand		86
Due from subscribers		546
Material and supplies		170
		$4,802

LIABILITIES.

Capital stock	$2,695	
Loans and bills payable	413	
Surplus	1,694	
		$4,802

The revenue account for the year ended July 1, 1912, was as below:

REVENUE ACCOUNT.
Year Ended July 1, 1912.

RECEIPTS.

Gross earnings	$1,826	
Miscellaneous receipts	61	
		$1,887

EXPENDITURES.

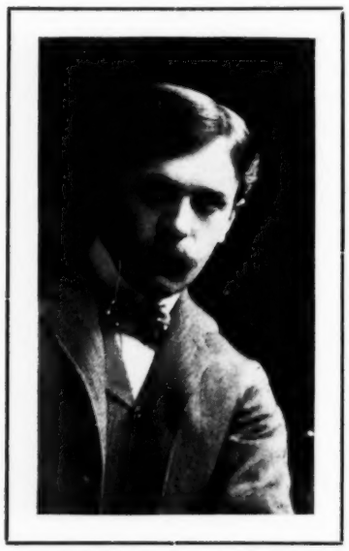
Central—Operators' wages	$482	
Supplies	38	
Repairs	46	
Rent	24	
		$590
Maintenance—Labor	81	
Supplies	30	
Miscellaneous	10	
		121
Repairs—Labor	97	
Supplies	222	
Miscellaneous	15	
		334
New construction—Labor	37	
Supplies	64	
Miscellaneous and telephones	94	
		195
General expenses and uncollected accounts		647
		$1,887

The depreciation fund is all expended in rebuilding the old lines. The territory is now covered so well that the necessity of building expensive lines is not apparent and the prospect is that the old lines can be rebuilt, provision made for necessary [illegible]sions, debts paid, and also satisfactory dividends at a 12 rate. Stockholders who have telephones now get $4 a year for dividend and wear of their instruments.

The secretary has a talent for mechanics and has several books on telephone principles and practice, such as Telephonology, and has been a subscriber of TELEPHONY for several years. He has been able to keep the switchboard and pole changer in working order without calling for the aid of an expert more than once. The questions and answers on theory and practice in TELEPHONY have rendered much assistance.

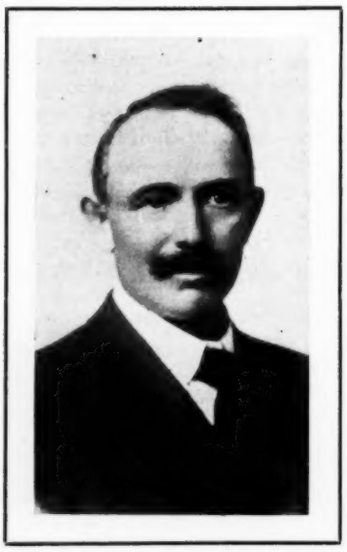
A Quartet of Men Prominent in the Telephone Field

ELWOOD GRISSINGER, consulting electrical and mechanical engineer, of Buffalo, N. Y., has, since about 1890, experimented largely in the telephone field. One of the results of his investigations has been the perfection of a telephone conversation repeater for improving the efficiency of telephonic transmission over existing circuits, and of extending the range of transmission. Mr. Grissinger was born in Mechanicsburg, Pa., March 3, 1869. He graduated as an electrical engineer from the Lehigh University, of South Bethlehem, Pa., class of 1894. He is a member of the A. I. E. E. and the A. S. M. E. After graduation Mr. Grissinger entered the shops of the Westinghouse Elect. & Mfg. Co., at Pittsburgh, being transferred, in 1896, to the Syracuse office as district engineer and salesman, and, in 1898, to the Buffalo office in the same capacity. From 1899 to 1907, he was interested in the development of the Niagara Falls power systems. Since then he has engaged independently in the practice of his profession. Mr. Grissinger is a Delta Upsilon and a Tau Beta Fi.

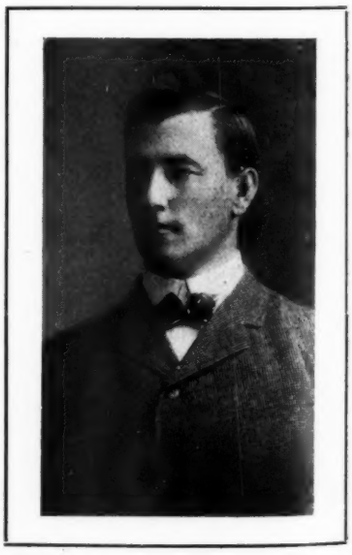


CARL W. WINKLER, commercial superintendent of the Illinois Telephone & Telegraph Co., Chicago, was a railroader and a newspaper man before entering the telephone field. He came to the Illinois Telephone company, then the Tunnel company, on December 7, 1911, from the Chicago Examiner offices, where he had charge of the circulation and promotion departments. From December, 1911, to May 15, 1912, he was manager of the promotion and publicity end of the telephone business, being appointed to his present position on the latter date, at the time of the company's reorganization. Mr. Winkler was born in Madison, Wis., June 18, 1878. His first employment was with the Great Northern Railroad, in the general office. Later he took up car records and was in charge of the "tons one mile" system. In 1896 he went to Salt Lake City for the Oregon Short Line, in a similar department. Fourteen months later he was again with the G. N., at Spokane, then at Seattle. He came to Chicago about 1903, and was with the Chicago Car Service Association for about a year. He is a Mason.

MARION EUGENE SHIPLEY, owner of the Lusk (Wyo.) Telephone System, and general manager and director of the Hooper (Neb.) Telephone Co., was born in Knox county, Ohio, July 16, 1868. He followed the printing and publishing business from 1884 to 1900, being for several years editor and publisher of the Stanwood, Iowa, Herald. He retired from the newspaper business a few years ago, while publishing the Sentinel, at Hooper. His telephone experience began with the organization of the Hooper Telephone Co., in 1900. The Lusk system was established in 1911. Mr. Shipley helped organize the Nebraska Independent Telephone Association and was one of its staunchest supporters for ten years. He invented the push button farm line telephone in 1898 and used it on the Hooper lines in 1900. On November 5, 1912, he was elected representative to the Nebraska legislature, from the 28th district, that in which Fremont is located, by an exceptionally large vote. Mr. Shipley is still a member of the Typographical Union, also of many other orders.



SOLOMON HOUCK McHENRY is secretary, treasurer and manager of the Capital Telephone Co., Jefferson City, Mo. He was born in Kansas City, Mo., June 21, 1868, and graduated from the Jefferson City grade and high schools. He is a member of the Masons, the Elks and the Knights of Pythias. He was one of the original incorporators of the Capital Telephone Co., which was organized and began business in 1900. He has always been active in the affairs of the Missouri Independent Telephone Association and has served as both district and state president of that body. Mr. McHenry's interests are not by any means confined to the telephone industry, as he has been engaged in the drayage business for the past twenty years. He is also freight solicitor for the Missouri Pacific Railroad Co. He is a director in the Jefferson City Commercial Club and is president of the school board. Mr. McHenry has always held that the telephone business was one of the best on earth and has demonstrated his belief by the manner in which he has handled the Capital City Telephone Co.



Abstract of Report on Situation of Chicago Bell

An Investigation Made for the Chicago City Council Committee on Gas, Oil and Electric Light to Furnish Data Upon Which to Base New Telephone Rates for Five Year Period, as Prescribed by City Ordinance—Third Installment

By Prof. Edward W. Bemis

THE BYLLESBY & ARNOLD APPRAISAL.

At this point the appraisal made for the company by Byllesby & Arnold becomes of vital importance. Does this appraisal, made with great care and regardless of expense, show that enough has been collected from the subscriber to keep in-

Subject.	Chicago Reproduction Value.	Suburban Reproduction Value.	Total Reproduction Value.
Buildings	$ 2,642,405.00	$ 320,498.00	$ 2,962,903.00
Land	1,173,937.00	157,706.00	1,331,643.00
Central office equipment	4,960,673.00	747,298.00	5,707,971.00
Subscribers' station equipment	6,409,151.00	1,281,074.00	7,690,225.00
Exchange lines	14,746,383.00	5,388,296.00	20,134,679.00
Toll lines	934,369.00	1,936,761.00	2,871,130.00
Construction in process	1,392,861.00	196,340.00	1,589,201.00
Office furniture and fixtures	245,151.00	20,957.00	266,108.00
Tools and vehicles	273,426.00	99,222.00	372,648.00
Supplies	660,288.00	261,308.00	921,596.00
Working capital	887,350.00	162,750.00	1,050,000.00
Total	$34,325,894.00	$10,572,210.00	$44,898,104.00
Plant development expense	$ 564,636.00	$ 183,352.00	$ 747,988.00
Total physical property	34,890,530.00	10,755,562.00	45,646,092.00
Cost of developing the business	4,753,993.00	2,340,253.00	7,094,246.00
Total property and business	$39,644,523.00	$13,095,815.00	$52,740,338.00

Table No. 7. Appraised Value New of Physical Property, August 1, 1911.

tact the investment by the stock and bond holders, of approximately $33,000,000? If not, then the investor is justified in calling on the telephone user for a larger yearly addition to the depreciation reserve. On the other hand, if the payments by the subscriber to this fund have more than kept the property intact, a smaller contribution may henceforth be reasonably made by the public.

In approaching this appraisal, however, hasty conclusions must not be drawn. An attempt must be made to correct the appraisal where it is found to be in error, even if in so doing, the value of the property may be reduced and the need for a depreciation reserve be thereby increased. In the long run the public will gain by a complete knowledge of the situation, and will not desire to take any unfair advantage of the appraisal.

On its face the appraisal would indicate that not only had the actual expenditures for maintenance kept the value of the property up to the above $33,000,000 but the appraisal would also indicate that in the opinion of Byllesby & Arnold, the property was worth much more today than even the sum of this $33,000,000 of investment and of the depreciation reserve. The following table, No. 7, will make this clear.

Referring to the totals in the last line, before deducting the depreciation, Byllesby and Arnold write (Appraisal Vol. 1, page 24-25):

"These totals represent the investment of the Chicago Telephone Company in its property and its attached business on the basis outlined, and include in addition to the appraised value of the physical property and the development cost of such property, no element of what is commonly designated as "going concern" value other than that represented by the cost of establishing the business, which cost has been worked out on the definite, conservative premises hereinabove described."

It would be fortunate indeed for the city, if the Chicago Telephone Co. were really entitled, in this rate investigation, to this value new of $52,740,338 or even to the present value of $42,915,926 based on the largest amount of observed and estimated depreciation which the appraisers were able to compute. The less the depreciation, the lower need be the rate of return to secure a fair profit on the investment. If there were no net depreciation whatever, not only would depreciation charges be eliminated, but the property would appear so much safer to the average investor, that he would furnish money for needed extensions, at a lower rate of return, than if the physical property every year bore a lower and lower proportion to the outstanding securities.

The larger the physical value back of stocks and bonds, the lower the rate of return, other things being equal, that will be demanded by the investor. A continual rise, for example, in the price of labor and material, would increase the cost of construction and the appraised value of the property, but would lessen the percentage of the present investment that would be borne by the old investment that is scrapped from time to time.

It seems necessary, however, to dissent from some of the positions taken by Byllesby & Arnold, and consequently to differ from some of the conclusions reached by them. In this no reflection is intended upon their well known ability and integrity of purpose.

COPPER.

Among the doubtful points in the appraisal may be mentioned the price of copper and the assumed life and net salvage employed by the appraisers. Copper was taken at 16 cents

		1902	11.626c
1893	10.817c	1903	13.235c
1894	9.472c	1904	12.823c
1895	10.693c	1905	15.590c
1896	10.964c	1906	19.278c
1893-6	10.487c	1902-6	14.510c
1897	10.250c	1907	20.004c
1898	11.954c	1908	13.208c
1899	17.729c	1909	12.982c
1900	16.545c	1910	12.738c
1901	16.110c	1911	12.576c
1897-1901	14.518c	1907-11	14.302c

Average for 1893-1901 ..... 12.726c
Average for 1902-1911 ..... 14.406c

Average for 1891-1911 ..... 13.610c

January,	1912	14.24c
March,	1912	14.60c
May,	1912	16.00c
July,	1912	16.90c
September,	1912	17.40c

Average, January to September .. 15.82c

Table No. 8. Average Price of Copper.

a pound, as of August 1, 1911. The following table, No. 8, gives the average yearly price for each of the 19 years, 1893-1911, inclusive, as taken from the Iron Age by the Chicago Telephone Co. These prices are a little lower than those given in TELEPHONY'S Directory of the Telephone Industry, 1912 edition (page 333):

The table would indicate that 16 cents was high. The com-

pany, however, has established an elaborate trend curve of prices of copper to show that 16 cents a pound is in line with the trend or tendency of prices, at the time of the appraisal. Since the earliest quotations at hand beginning in 1883, copper has averaged less than 16 cents every year save in 1888, 1899-1901 inclusive, and 1905-1907 inclusive. During those years only 309,433 miles of wire out of 807,571 in use at the close of 1911, or 38 per cent. were laid. It would be easy to show that copper had not from the beginning averaged over 15 cents and had not even averaged that during any period of five or more years preceding the appraisal. At the same time if the test of value is not to be the actual cost or recent costs, but probable costs of material and labor during the next five years, then 16 cents may be accepted as a probable price.

Description.	City.	Percentage of Base.	City and Suburban.	Percentage of Base.
*Base figure	$26,762,224.69	100.00	$35,217,600.90	100.00
Organization, engineering, etc.	3,263,204.54	12.19	4,468,147.48	12.68
Total of above	30,025,429.23	112.19	39,685,748.38	112.68
Brokerage	2,020,353.27	7.55	2,573,153.96	7.31
Entire value new	32,045,782.50	119.74	42,258,902.34	119.99
Entire overhead, included in above	5,283,557.81	19.74	7,041,301.44	19.99

*Aside from construction in process and working capital.

Table No. 9. Summary of Overhead Charges.

Overhead Expenses.

We will first take up the appraisal of property new and later consider the depreciation.

The appraisers, Byllesby & Arnold, have assumed that the telephone company's property and business are not in existence, but are to be constructed new. After an exhaustive inventory of the principal items of the property, they have estimated the cost of materials, tools and labor required to reproduce new each item in place as of date of August 1, 1911. In this base figure were included all contractors' charges, which would embrace his costs, his profits and his allowance for contingencies. No general contractor was assumed, but a contractor was allowed only such portions of the work, as have usually been put in by contract, such as buildings and central office switchboards. To the base cost obtained as above, a percentage, varying with the different classes of work, was added for reorganization, engineering and incidentals. In these items were included general office expenses in securing bids, awarding contracts, making out bills of material, purchasing materials, legal expenses and salaries of the officials, whose work is chargeable to construction. Engineering includes preparation of plans, drawings and specifications, and the expense of general supervision and inspection in the carrying out of the plans and specifications. Incidentals include insurance against fire and accident, and all general expenses lying outside of the estimated contract cost, such as small changes in design. They might be included as extras on the contract price.

These expenses vary from 5 to 15 per cent. in the various schedules, aggregating 12.19 per cent. In case of land only 5 per cent. was added, which was intended to cover selection of site, search of title, purchase fees and such of the reorganization and incidental expenses mentioned above as were applicable.

After adding to the base figures the above allowance of 11 to 12 per cent. for reorganization, engineering, etc., a further percentage of about 7 per cent. was added to cover interest and taxes during construction, and other so-called carrying charges and cost of obtaining money. They have all been termed brokerage. This was small in the case of substation equipment, tools, vehicles and supplies, which, it is assumed, are put in service immediately upon purchase. The following table, No. 9, summarizes the matter of overhead.

It the value of this plant is to be determined by what it would cost to duplicate it, if all knowledge of the present location of the conduits and central stations, etc., were suddenly obliterated from the mind of man, then this allowance of 19.99 per cent. for overhead on top of contractors' profits on each portion of the work is no higher than engineers often claim in such appraisals.

The writer, however, has always contended that one could not assume such a fanciful theory as the above, but must assume that the knowledge now possessed, and indeed, in large part reduced to writing in the inventory, cannot be blotted out of men's minds even for the purpose of an appraisal.

The Wisconsin Railroad Commission only allows 12 per cent. above base figures and in its base does not include so much contract work. The Massachusetts Gas and Electric Light Commission will have nothing of this theory of reproduction, but sticks to the historical costs.

All of the installation of cables and much of the subscribers' sub-station and some of the central office equipment were done direct by the Chicago Telephone Co., without any contractor and probably with less than 15 per cent. for overhead instead of 19.99 per cent.

As for brokerage, of which the chief item is interest during construction, this Chicago company has always earned enough to pay all such charges and large dividends besides. If brokerage had been charged to construction in the past, operating expenses would have appeared less and profits greater. A greater reduction of the rates in 1907 might then have been secured. The company having secured the benefits of charging brokerage to operating expenses can hardly put the charge now into construction.

If the overhead allowed by the appraisers had been only 15 per cent. instead of 19.74 per cent. in the city, and 19.99 per cent. in the entire territory, the appraisal new would have been reduced $1,268,696 in the city, and $1,757,684 in the entire territory.

Land.

The land owned by the company in the city and suburbs, cost the company, according to their books, $601,801.14. Its present value is given by Byllesby & Arnold at $1,331,642.60, an increase of $729,841.46 or 121 per cent.

In the following table, No. 10, is given the book value; that is, the cost as apearing on the books, and the appraised value after the addition of all the overhead charges and the relation between the cost and the appraisal for each piece of land in the city.

	Appraisal.	Book Value.	Increase over Book Value.	Per cent. Increase.
Austin office	$ 16,124.06	$ 9,200.00*	$ 6,924.06	75.3
Calumet office	61,425.00	33,513.08	27,911.92	83.3
Canal office	7,371.00	6,000.00	1,371.00	22.8
Central Division headquarters	21,498.75	17,539.75	3,959.00	22.6
Cortland street lots	2,457.00	1,652.49	804.51	48.7
Douglas office	19,751.99	18,084.00	1,667.99	9.2
Edgewater	3,071.25	2,000.00	1,071.25	53.6
Harrison street lot	257,985.00	176,972.77	81,012.23	45.8
Humboldt office	5,769.34	4,200.00	1,569.34	37.4
Hyde Park office	6,142.50	5,687.50	455.00	8.0
Irving Park office	6,081.08	3,530.00	2,551.08	72.3
Kedzie office	4,422.60	3,120.00	1,302.60	41.8
Lake View office	4,422.60	3,360.00	1,062.60	31.6
Lawndale office	7,033.16	4,000.00	3,033.16	75.8
Lincoln office	5,307.12	5,500.00	192.88†	3.5
Main office	462,723.58	40,420.00	422,303.58	1044.8
Monroe office	24,692.85	14,362.50	10,330.35	71.9
North office	22,113.00	21,525.00	588.00	2.7
Northern Division headquarters	25,798.50	14,488.35	11,310.15	78.1
Oakland office	10,411.54	10,500.00	88.46†	.8
South Chicago headquarters	7,383.29	7,175.00	208.29	2.9
Southern Division headquarters	12,511.04	7,000.00	5,511.04	78.8
Wabash office	144,840.15	96,026.17	48,813.98	50.8
Wentworth office	7,371.00	5,610.00	1,761.00	31.4
West office	2,616.71	4,090.00	1,473.29†	36.0
West Pullman office	1,228.50	1,000.00	228.50	22.8
Western Division headquarters	17,291.01	10,550.00	6,741.01	63.9
Yard office	6,093.36	4,550.00	1,543.36	33.9
Total	$1,173,936.98	$531,656.61*	$642,280.37	119.4

*Given in the appraisal by mistake $4,700 less.
†Decreases.

Table No. 10. Land Appraisal and Cost.

How to treat the increase in land values, in a rate case like

this, has been and still is a much disputed and unsettled question. The tendency of the courts has been toward the recognition of this increased value. Such has also been the practice of the Wisconsin Railroad Commission. On the other hand, the Massachusetts Gas and Electric Light Commission, which

Description.	City.	Percentage overhead to base.	City and Suburban.	Percentage overhead to base.
Base figure	$ 955,585.65		$ 1,083,958.15	
Reorganization, engineering, &c.	47,779.28	5.00	54,197. 91	5.00
Total of above	1,003,364.93	105.00	1,138,156,06	105.00
Brokerage	170,572.05	17.85	193,486.54	17.85
Total value	1,173,936.98	122.85	1,331,642.60	122.85
Overhead included in above.	218,351.33	22.85	247,684.45	22.85

Table No. 11. Land Base and Overhead.

has, by far, the greatest age and prestige of any of our commissions, has always refused to recognize increase in the regulation of rates. It is held that only on the sale of such land can the company divide as a surplus, the unearned increment, and it is not certain that even then the Massachusetts Commission would not compel the use of the proceeds of the sale in meeting needed extensions. The only other commission of any age which has considered this question very fully is the Public Service Commission of the First District of New York, covering the City of New York.

In the case of the Queens Borough Gas & Electric Co., decided June 23, 1911; the Brooklyn Gas Co., decided August 18, 1911, and the Kings County Lighting Co., decided October 20 and November 17, 1911, this commission held that if the company were entitled to capitalize the increased value of its land, then the annual increase of such values should form part of the reasonable rate of return to which it was entitled and the returns from the consumer in charges should be proportionately reduced.

Commissioner Lane of the Interstate Commerce Commission, in rendering the report of the commission, relative to the proposed advances in the Western Trunk Line Trans-Missouri and Illinois Freight Committee territories, held (20 I. C. C. Rep. page 344):

"Whatever the true economic or legal view may be as to the right of a carrier to consider the increase in value of its land as a part of the value upon which it is entitled to a reasonable return, such increase in value does not of itself establish the right of a carrier to increase rates upon a given service. Certainly if the supreme court may decline to lay down the absolute rule that 'in every case failure to produce some profit to those who have invested their money in the building of a road is conclusive that the tariff is unjust and unreasonable' (Reagan v. Farmers' Loan & Trust Co., 154 U. S., 412), it is a conservative statement of the law to hold that a railroad may not increase the rates upon a number of commodities solely because its real estate has risen in value."

If the appraisal be correct, the value of the land has increased from $601,801.14 to $1,331,642.60. This is a yearly arithmetical increase of 10.5 per cent. on its original cost. The method by which this result is reached is as follows: The cost of the land on December 31, 1887, was $40,420. Now, $40,420 used for 24 years to the close of 1911 is equivalent to $1,018,080 used for one year. By December 31, 1892, an additional amount of land had been acquired costing $182,634. This for 19 years is equivalent to $3,470,046 for one year. Reckoned in this way the land is equivalent to $6,995,621 for one year. The total increase of value of $729,841.46 is 10.43 per cent. of this. An increase of 10.43 per cent. of the original cost ($601,801.14) owned on August 1, 1911, the date of the appraisal, is $62,768 a year. This is the annual amount of increase of land values which on the basis of its past history, the company may reasonably expect to receive during the next few years. It represents an addition to its income of about one-quarter of 1 per cent. on its stock, and is taken into consideration by the New York Public Service Commission, First District, in fixing rates.

Paving.

The appraised value of the paving over the conduits in the city is $2,198,916. Of all the conduits, 84 per cent. are under the paving, but two-sevenths of this paving was put down after the laying of the conduits, and represents no investment by the telephone company. The appraisal of this portion of the paving, $628,262, should be deducted. This is in accordance with the ruling of the Wisconsin Railroad Commission, the New York Public Service Commission of the First District, the Massachusetts Gas and Electric Light Commission, the Iowa State Supreme Court, recently confirmed by the United States court in the Cedar Rapids gas case, and by Judge McPherson of the United States District Court in the Des Moines gas case.

Commenting on the matter of paving, and on the general theory of considering only the cost of reproduction, which is the method used by Byllesby and Arnold, Judge McPherson in his opinion, August 21, 1912, says:

"But the question is as to its value today with reference to income. What it may have cost is pertinent. What it will sell for is to be considered. And if destroyed by any agency, such as rust, crystallization, or other forces, what must be paid to reproduce it is a subject of inquiry. All of these may be considered. In my opinion those who maintain that what it will cost to reproduce the plant, less depreciation, is the true value, in many instances, confound the real question with one of many evidences of the real value. Reproducing cost is an evidence of what the real value is after subtracting the depreciation. But what is to be done with the value of stocks and bonds on the productive theory? And what becomes of the original cost on the reproduction theory? And what becomes of the question of the increase or falling off in numbers of consumers? And the same as to increased or diminished expenses?

The theory at first thought in all cases is plausible and attractive, but in the end is oftentimes utterly illogical and unreliable, originally adopted as a mere time-saver by mere theorists, and sought to be enforced as against the substantial unbending facts. If the plant is to be reproduced, when is it to be done? If reproduced, will the streets then be paved, and, if paved, paved with what? Must all be reproduced at once, or the same covered by a number of years? If but gradually reproduced, why should not such cost go into either the operating or maintenance account? No one can state when it must be reproduced, and a material question arises: What, then, as compared with the present, will be the price of labor, material and freight? But finally and to my mind the conclusive reason against the soundness of the reproduction under paved streets theory is, that to allow that theory to prevail, and to increase the capitalization now to the extent of $140,000, is to allow such gas rates as will pay a dividend on such sum from and after this date. But the sum of $140,000 is not put in the capital or value account until the plant is reproduced.

As, of course, streets paved or unpaved make no difference in the earning power of the gas plant, and but little, if anything, goes more directly and accurately to the question of value of any structure or plant than its rental, earnings, or as a dividend producer.

There are many instances in which the reproduction theory is the best of all methods for getting at the present value, and in other instances the most misleading. And it is deceptive, in my opinion, to now add the cost of taking up and replacing pipe under paved streets at an estimated cost of $140,000 extra, and does not warrant an increased dividend of $8,400 or some greater sum. Such a dividend is a mere paper dividend, and is arrived at, not because of increased earnings, not because of increased capital or investments, not because of increased operating or maintenance expenses, but solely by reason of a supposed necessity of at some time replacing the same, in some manner, under a then some kind of street, on a mere guess of what labor and material would then cost. Many of the principles with relation to railway rates are applicable to gas rates. And perhaps the latest analysis of the reproduction theory is found in the recent case of Louisville R. R. vs. Railway Commission, 196 Fed. Rep. 800, in an opinion of Judge Jones that it is not a hard and fast rule covering all phases. Finally, pipes under a paved

street are of very long life; many times longer than if the street were not paved.

The theory applied to paved streets is but a theory, is illogical and against facts, and was properly denied by the Master."

An added reason of great importance in this case for excluding paving since the laying of the conduit is in the ordinance of November 6, 1907. This provided that if the city should purchase the property on January 1, 1919, or 1924, or after the expiration of the franchise January 8, 1929, should transfer to any other company such right, the rules governing the valuation to appraisers should be as follows:

"The appraisers shall determine what tangible property, real and personal, owned by the said company, and used for the purpose of this grant, is reasonably required for its continued operation, taking into consideration the then condition of the art, and in determining the fair cash value of said property they shall not take into consideration its earning power, or the value of the rights or privileges hereby granted, or the value of any license or franchise, but shall allow for the property the then cost of duplication, taking into consideration the then condition of the art, less depreciation. In considering the cost of duplication of underground conduits, wires, cables, electrical conductors and any other underground construction located in any street, allev or other public way which was or were placed therein at a time when such street, alley or other public way was unpaved, the said appraisers shall not take into consideration the cost and expense of removing or replacing any paving, or part thereof, in such street, alley or other public way. An award in writing, signed by a majority of the appraisers, shall be valid and binding upon the parties."

Working Capital.

The appraisers not only appraised working assets, such as supplies, at $921,596, but they assume that the company needs, in cash or its equivalent, $1,050,000. This form of working capital they divided between the city, $887,250, and the suburban division, $162,750. The total when added to the supplies makes a total working capital of $1,971,596. Even the estimate made by Mr. Hall, of $1,750,000, seems large.

Expenses for one and one-half months would be one-eighth of the $8,836,827.49 of total expenses in 1911. In other words, it would amount to $1,104,603.44. In a company which collects its revenue monthly and receives some of it in advance, a working capital equal to the expenditures for one and one-half months would appear to be ample, especially in view of the fact that it can obtain at least 30 days' credit on most of its purchase of supplies. Now, one-eighth of the entire payroll for the year 1911, of $6,332,485, is only $791,561. The current assets of cash and dividends, bills and accounts receivable, and prepaid expenses at the close of 1911, exceeded the accounts payable by only $475,212.17. Such a sum added to the entire appraised value of the supplies, of $921,596, would be only $1,396,808.17.

In view of all this, $1,500,000 would appear to be a maximum amount necessary to allow for all forms of working capital. This is $578,404 in excess of supplies on hand. However, as the matter relatively is not of large importance, $1,750,000 may be used for the entire working capital, or $828,404 for that portion of the same, viz., cash or its equivalent, for which the appraisers allow $1,050,000. A reduction from the appraisal may thus be made of $221,596.

If this be apportioned between the city and suburban territory, in the ratio of the reproduction value, then 76.26 per cent., or $168,989, would be taken from the working capital allowed by the appraisers for the city.

Cost of Plant Development.

After reaching a reproduction value new for a physical property of $44,898,104, or one-third more than the $33,000,000 of stock, bonds and loans from the banks, the appraisers add $747,988 for changes that may be made in the plans as the work of construction during the assumed five-year period proceeds. In the words of the appraisers:

"The expenditures cover a variety of items, such as the alteration or reconstruction of buildings to provide for the enlargement of the plant, and reconstruction or enlargement of equipment incident to the growth of the business. For example, certain exchange offices when built were of ample capacity to handle the needs of the company at the time they were constructed. They, however, were built with provision for extension at a future time, and at a later date they were reconstructed and enlarged as necessary to handle the needs of the company. As a result the total expense of buildings to the telephone company, including this reconstruction, is greater than the value of the property as determined by inventory of the building as it now stands.

In a similar way, many changes in telephone equipment have been made due to the development of the business, which have entailed expenditures that would not be included in any value arrived at by the inventory. It is the intention to include in the plant development expense such an amount as would represent the normal expenditure that would be made in case the property is reproduced within the assumed construction period of from five to eight years."

The allowance for this purpose is 2 per cent. on the cost of buildings, central office equipment, subscribers' station equipment and exchange and toll lines.

It may be a logical consequence of the theory of reproduction to allow this plant development cost, but to one who holds that a voucher is better than an estimate, and that the cost of recent construction furnishes better unit figures for reconstruction than does the judgment of even the best engineers, it does not appear to be a correct view. Since the entire construction cost that has gone on the books of the company is only five-sixths of the estimated reproduction cost as estimated by Byllesby and Arnold, a further addition of nearly $750,000 for estimated changes of plant during construction seems hardly warranted. The cost of such changes must have been put upon the books and must have appeared in the book value of the property, or must have been charged to operating expenses and thus have been paid for by the telephone subscriber. In the former case, the company secures the equivalent of the above cost. In the latter case, it does not appear entitled to this value, if secured from the consumers under the guise of operating expenses. If the latter, as put upon the books, had been less, the profits would have appeared to the community greater, and there might have been an even larger reduction of rates in the November, 1907, ordinance than was made.

Cost of Developing the Business.

For the cost of developing the business in the city, the appraisers have added $4,753,993, and in the entire territory $7,094,246. The estimate is so large and the matter so important that the argument of the appraisers may be quoted:

"It is needless to say that the physical plant of the company has no value other than second-hand or scrap value, unless the plant is utilized for the purpose for which it is constructed, and the plant cannot be utilized for this purpose unless the business has been secured.

In estimating this element of value, the following method has been pursued. It has been assumed, as stated before, that the property could be reproduced within a period of five years. A construction schedule has been prepared, in which dates are assigned for the construction of various portions of the property now existing. In making up this schedule the plant has been reproduced somewhat as follows:

It has been assumed that, first, certain pieces of real estate for downtown offices will be purchased, and, next, that the exchange buildings will be constructed, building space to be of the present capacity, and that central office equipment or a fraction of the present capacity will be installed as the first installation; also that the conduit lines in the given section will be built complete, and that sufficient cables will be installed with the first installation to serve the partial equipment in-

(*Continued on page 813.*)

Queries on Theory and Practice

Electromagnetic Induction on Grounded Line.

"We have a grounded circuit in our exchange which is in the neighborhood of the street circuit for electric lights. The lights are on only at night, consequently our line picks up induction only at that time. As the induction picked up is very light, the question that confronts me is this: Why is it that the induction on this line is greatly increased by cutting into the line one or more receivers? Also, how can this trouble be cleared?"

Your induction from the electric light circuit is probably due to electromagnetic induction rather than to static induction. If you listen in on the line at the central office, with the receiver on the hook at the subscriber's telephone, there is relatively high impedance in circuit due to the bell coils. Hence the current flow due to the induced voltage is weak. But if the subscriber takes the receiver from the hook, it removes the bell and substitutes the receiver and induction coil, which are of much less impedance than the bell. Hence, the induced current flow becomes greater and you hear more noise.

The trouble can be cleared by making the line metallic, or by moving it farther away from the electric light circuit.

Annunciator and Telephone System Combined.

"I have been working on an intercommunicating annunciator and telephone system and have everything working all right. My trouble is this. When I plug in a number, either bell or telephone and lift the receiver from the hook of the office telephone, the bell will ring through the telephone. Will you please give me the cause and where I would most likely find the trouble? I enclose a pencil sketch of the system. As near as I can tell the system is a three-wire return call system, telephones and bells are all wired alike, with one wire from batteries supplying every instrument. The jack board contains merely plug holes and there are no drops. One simply places the plug in the number wanted and presses the buttons designated in the drawing. By placing the plug in a jack and lifting the office telephone receiver from hook, the bell or telephone will ring in series with the office telephone, the telephone operating like the push button on board should operate, and the push buttons not operating at all."

The diagram which you sent in has been redrawn as a hotel call system, Fig. 1. The telephone, T_5, has been inserted to show how it would be wired according to your description. It will be seen that when a guest presses the button in his room, No. 4, for instance, it will operate annunciator No. 4 and ring the call bell. The latter is common to all the annunciators.

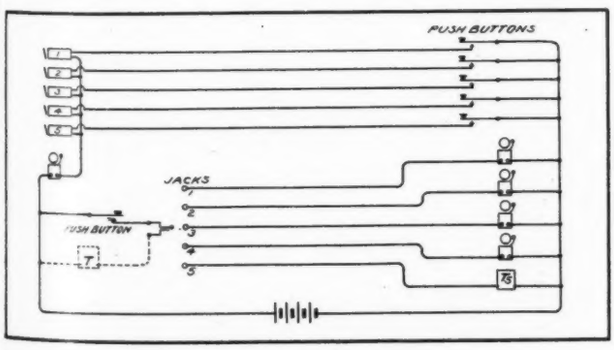


Fig. 1. Diagram of Hotel Call System.

The office telephone, T, is shown as connected to the plug and indicated by the dotted lines. In your diagram it was not shown connected to anything. It looks most reasonable that it would be thus connected. Also, is is very likely that the telephones are of the simple series type, such as shown in Fig. 2*A*, with the bell wired to the lower contact of the switch hook and the transmitter and receiver in series with each other and wired to the upper contact. The office telephone may have no bell as in Fig. 2*B*, since the call bell of Fig. 1 is sufficient.

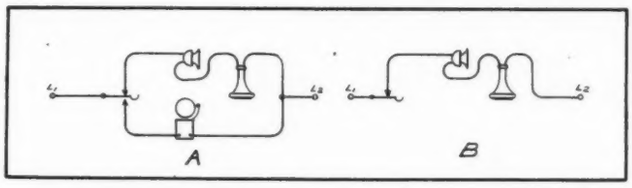


Fig. 2. Office Telephone Circuit with and without Bell.

Under the conditions as outlined, it will be seen that when the plug is inserted in any jack and the receiver of the office telephone lifted from the hook, current will flow from the ringing battery through the transmitter and receiver and ring the bell of the line connected. It is a normal action and should be expected. Under only one condition should it not occur. That is if the battery is not strong enough to ring the bell through the resistance of the office telephone.

If there are further conditions which are not covered, write again.

Grounding of Lines After Passing Through Cable.

"We are putting up about 5,000 feet of cable and moving our switchboard into another building. Our system is magneto, with both rural and town telephones. Our lines are all single wire and grounded. In the old office where the switchboard is now located, we have the sleeve side of the drops all on the same ground and are running single through what little cable we have installed.

We have eight can terminals with tubular fuses and carbon protection. Twenty-five and 50 pair cans are used for our new cable and we are planning on running metallic through all the cable and ground one side in the can tops. What kind of a ground would you recommend for the can tops? Would taking the mica from between the carbons on one side of line make a sufficient ground?

Our anchor rods which hold the messenger are all down six feet or more in good moist clay. Would grounding the can tops on messengers be all right, or would you advise a ground rod and wire at each can terminal? Would like your complete idea of grounding one side of cable in can top of the kind described."

It will not do to depend on the ground connection which would be obtained by taking the mica out from between the carbons. The contact between two carbons is not reliable, and may easily rise to a high resistance. While the messenger and anchor rods might give a good ground for a time, we do not feel that it is sufficiently reliable. A double galvanized iron rod driven eight or ten feet into moist earth, with the wire soldered to its top, is much better. A copper sheet or one of the patented ground cones will be still better.

The wire from the can top to the ground rod or cone should be run as straight as possible. We advise running a No. 12 copper wire along the terminals in the can top, to ground the ground plate, also strapping together one side of all the pairs. The tubular fuse should be between the carbon blocks and the line, so that strong current entering will have to pass through the fuse before striking the arrester gap to earth. Then you may omit the fuses on the grounded side of each pair.

In the Rural Line Districts

We understand there will be a change in the telephone central soon. Mr. Miller is going to let some one take some of the grief a while.—Daykin Item De Pere (Wis.) Democrat.

The Farmers Mutual Telephone Co. is improving its line through Greenfield by putting in new poles and cross-arms. —Baraboo (Wis.) Democrat.

The Farmers Mutual phone exchange in this city reports new phones as follows: John Ziegler, residence, 11; Charles Warpup, residence, 72; Earl Shearer, farm, and Emmet Kaufman, farm.—Columbus (Ind.) Post.

The stock holders on one of the telephone lines from here to Vandalia, have been repairing their line the past week, having put on new wire and other needed work.—Vandalia (Mo.) Leader.

The office of the LaRose Telephone Co. has been moved down stairs, which will be a convenience for patrons and operators alike.—LaRose Item in Minonk (Ill.) News.

The manager of the West Liberty Telephone company was in the neighborhood Saturday adding some repairs to the lines along this way.—Monroe Township Item in Urbana (Ohio) Democrat.

A much needed change in the telephone system was completed Monday but it didn't go into effect until Wednesday. Heretofore if you wanted to talk to Norris or Canton, Yates City or Galesburg, you had to go around "Robinhood's barn" and several other barns, to get a message through. Nobody would have cared about the barns if the trick could have been pulled off without waiting 24 hours. Now it may be a pleasure to use 'phones as we have direct connection with these places—thanks to the efforts of President Vandersloot of the local company.—Farmington (Ill.) Visitor.

A number of Bell telephone men are in town, where they are making repairs on the line. They will be here for a number of weeks.—Star Junction Item in Connellsville (Pa.) Courier.

A new telephone line is to be built soon from Quinn to Lucerne.—Plainview Item in Milan (Mo.) Republican.

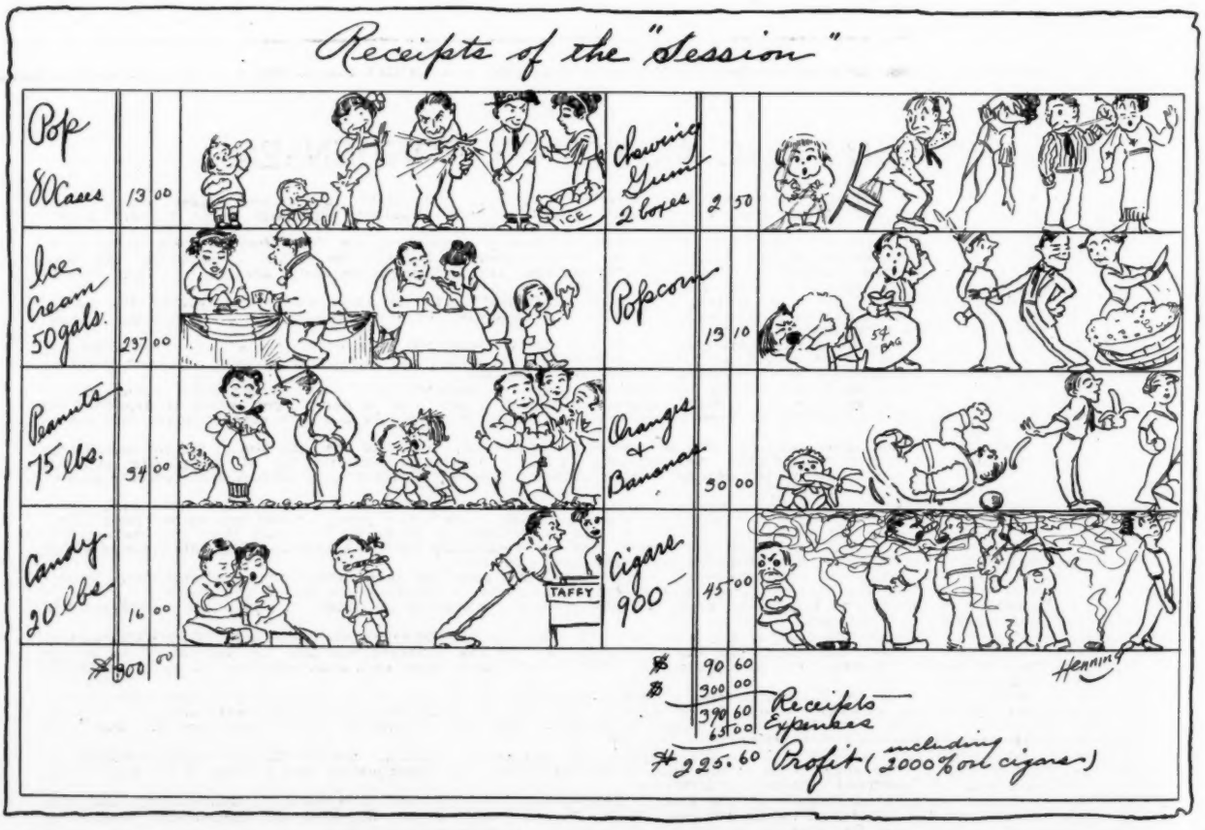
At the telephone meeting last Saturday afternoon it was decided to buy a part of the John Reisch property and build a new house on the lot for the switchboard.—Troy Item, Milton (Iowa) Herald.

The linemen of the Western Union Telephone Company arrived in town yesterday and will be here about two weeks looking over the lines and making necessary repairs. They are stopping at the Washington house.—Middleton Correspondence, Harrisburg (Pa.) Independent.

The Connecticut Company and the Telephone Company have made a great change in the appearance of the street by cutting down several of the large trees.—Burnside Letter, E. Hartford (Conn.) Gazette.

During the last three years a quarter of a million new telephones have been installed in various farmhouses throughout the country.—Spokane (Wash.) Chronicle.

The Corn Belt Telephone company has employed a force of men, and expects more in order to complete the work before cold weather.—Tripoli Item, Waterloo (Ia).) Courier.



The last picnic of the Salemsburg Telephone Co. was the most successful ever held and the financial returns show that it was the largest. The refreshment committee noted the sale of the following items in the day's business at the stands: Pop, 80 cases; ice cream, 50 gallons; peanuts, 75 pounds; candy, 20 pounds; chewing gum, two boxes; popcorn, 275 boxes; oranges, two cases; one bunch of bananas; 900 cigars. The total receipts were $390.60 and the net receipts after all expenses were paid were in the neighborhood of $225.—Salina (Kans.) Journal.

In the Museum of Antiquities is about the only place nowadays you ever find No. 14 copper twisted pair.

No. 17 Copper Clad twisted pair is the only thing actually used outdoors today—and a lot of people are connecting it to No. 14 Copper Clad from the pole to the switchboard.

In a little while, No. 12 copper will go to the Museum too—because the No. 14 Copper Clad is twice as strong and costs only half as much.

Trade Mark
"Weld Clad"

Duplex Metals Company

Chester, Pennsylvania

CHICAGO OFFICE
853 Peoples Gas Bldg.

NEW YORK OFFICE
30 Church Street

INTERESTING NOTES ON CONDENSERS

In the early days of telephony, Condensers were invariably built up from solid tin foil and waxed paper. Such Condensers are, however, apt to break down and become crossed or short-circuited, especially under modern conditions.

A grit in the foil or a pin-hole in the paper is sufficient to cause a breakdown, and the defect can seldom be made good because the two foils become welded together by the current passing through the fault. Occasionally the weld can be burnt out by a strong current, but this generally damages the Condenser seriously, because the solid foil is of appreciable thickness and requires a heavy current to fuse it.

The minimum thickness of foil commercially usable is determined partly by the high cost of rolling the metal, and partly by the difficulty of handling extremely thin foil. Consequently, the foil commercially used is much thicker than is called for by the electrical conditions.

The ideal conditions of an extremely light and thin film of metal, combined with considerable mechanical strength, seem therefore to be impossible of attainment; but, nevertheless, the apparently impossible actually has been attained, and as the result, the manufacture of Condensers is being revolutionized.

The solution of the problem was found by the English telephone engineer, G. F. Mansbridge, who conceived the idea of employing for Condenser work a specially prepared metallized paper, i. e., a paper upon which is deposited an extremely thin film of pure tin, forming an even and continuous conducting layer in absolute contact with, and inseparable from, the paper.

In this combination, the paper provides the necessary mechanical strength, and the thin film of tin the conducting electrode. The thickness of this film is such that, whereas there is ample conductivity for all telephonic currents, there is so little mechanical strength **in the film alone** that it instantaneously shrivels up if subjected to currents greatly in excess of its normal carrying capacity.

This property of shriveling up under excessive current is of great value, since a Condenser made from such material (known generally as a **MANSBRIDGE CONDENSER**) is rendered absolutely proof against breakdown from internal crossing or short-circuiting. If an internal short-circuit be accidentally or purposely produced, the Condenser at once begins to discharge itself across the point of short-circuit and the momentary current concentrated at this point is strong enough to shrivel up the conducting film **immediately surrou**nding the point.

By this **localized** shriveling up, the film isolates itself from the point of breakdown, and the insulation of the Condenser is preserved, since the heat developed by the transient current is insufficient to scorch the paper.

This automatic sealing of the breakdown point may be repeated thousands of times, and still the Condenser will retain its capacity and its insulation.

So instantaneous is the sealing that, if a pin be driven into an insulated charged **MANSBRIDGE CONDENSER** so as to cause a short-circuit between the electrodes, the rush of current to the puncture will seal up the defect before the Condenser has had time to do more than partly discharge itself. A dozen or more such punctures may be made before the Condenser becomes discharged.

Just as a **MANSBRIDGE CONDENSER** seals up when punctured by a pin, so does it seal up, automatically and instantaneously, when the puncture is due to a lightning discharge or other high tension current; and it is because of this remarkable and permanent immunity from breakdown that the Condenser was named **by its users** the **MANSBRIDGE DREADNOUGHT CONDENSER.**

Besides possessing this valuable and unique property of automatic sealing, **MANSBRIDGE CONDENSERS** are cheaper, smaller and lighter than those made from solid foil; and they consequently are forcing their way to the front and becoming **the accepted standard everywhere.**

They have been adopted exclusively by the English government Telegraph and Telephone Administrations; and they are made under license by Western Electric Company, L. M. Ericsson Co., Electric Specialty Co., Stromberg-Carlson Co., American Electric Telephone Co., and by numerous other licensees all over the world.

Insist upon having MANSBRIDGE CONDENSERS and save money in first cost, and also in maintenance.

For further particulars and for terms of manufacturing license in U. S. A. and Canada apply:

G. F. MANSBRIDGE, Mount House, New Barnet, England

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Last longest; cost less to use

GOOD service is what you want in a dry battery; you get it when you purchase 1900 batteries. The average time of service of 1900 batteries is longer than any other. A proven fact. Wouldn't it pay you to use them? May we quote you prices?

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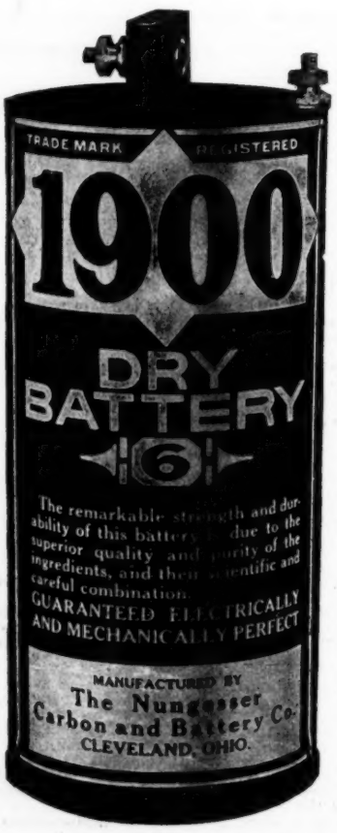
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The remarkable strength and durability of this battery is due to the superior quality and purity of the ingredients, and their scientific and careful combination.
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CLEVELAND, OHIO.

Handled by all jobbers

We Pay Your Repair Bills

Rather a startling statement, isn't it?

Let us tell you about it.

We have such positive knowledge that Chicago Telephones are trouble proof that we bind ourselves legally to pay all repair expense. We pay not only for materials required, but also for the time and expenses of your trouble man while he is going to and from the telephone, and while he is making the repair.

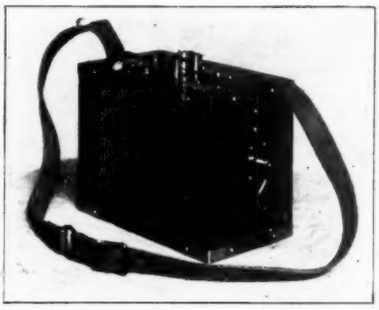
If the telephone is ten miles from your Exchange this expense item might be greater than the price of the telephone. We can afford to do this because the percentage of Chicago Telephones that ever need attention is negligible. During the year ending July 1, 1912, with six hundred thousand telephones in use, this trouble insurance cost us only $274.00.

No other telephone factory dares to duplicate this repair service because no other telephone is good enough to justify it.

Write for booklet entitled "Making Good."

Chicago Telephone Supply Co.
Makers of Telephones and Switchboards
Elkhart, Indiana, U.S.A.

A WINTER TIP TO THE EASY WAY



USE THIS
TEST SET

It tells which way and how far to go for the trouble without cutting a wire.

Can be used with gloves on

Sent on trial

Stewart Brothers
OTTAWA, ILL.

Every Telephone Company in the United States

will receive from us a circular describing our Rental and Toll Record and Cash Books. If you haven't received yours let us know.

This costs money, but it is our method of advertising the fact that the use of our Books and Blanks so simplified Telephone Book-keeping as to render it a pleasure rather than a burden.

Drop us a card and get a *free* list of samples.

The Telephone Printing Co., 320 Second St., Defiance, O.

PROPOSED RATES FOR SAN FRANCISCO.

(*Continued from page 795.*)

The bill provides first for the filing by the company within 90 days of a complete inventory of its property in the city. This enters into the most minute detail. Every item is to be followed by the "actual cost price, date of purchase and present reasonable market value." The bill continues: "In all items of construction, the percentage of cost allotted for construction and labor shall be given separately from the expense of engineering; also the percentage allowed per annum for deterioration since construction or installation shall be given." This inventory must be accompanied by an affidavit certifying to its correctness, signed by two officers of the company, one of whom must be a director.

The maximum rates for the year beginning July 1, 1913, are set forth as follows:

BUSINESS RATES.

	Per month	Excess calls, each
Single line, 80 calls	$ 4.00	3½ cents
Single line, 185 calls	6.00	3 cents
Single line, 250 calls	7.75	3 cents
Single line, 390 calls	9.75	2½ cents
Single line, 540 calls	11.25	2 cents
Single line, 780 calls	13.25	1½ cents
Single line, 1,100 calls	16.50	1½ cents

Coin Collecting Station.

	Per month	Excess calls, each
Single line, 60 calls	$4.50	3½ cents
Two-party line, 60 calls	4.00	4 cents

	Per day	Excess calls, each
Single line, five calls per day	20 cents	4 cents
Two-party line, four calls per day	20 cents	4 cents
Four-party line, two calls per day	10 cents	5 cents

Four-party line, $1 per month; 5 cents per call.
Extension telephones, 40 cents per month.

Private Branch Exchange.

Each switchboard and operator's telephone, including ringing power	$5.00
Each trunk line	2.25
Each additional telephone, for the first 25	.50
Each additional telephone over 25	.25
Each desk set in place of wall set, additional	.10
Each call	.01½

Public Telephone Service.

No call to exceed 5 cents, except that hotels may charge 10 cents.

RESIDENCE RATES.
Unlimited Service.

	Per month
Single line	$3.00
Two-party line	2.75
Four-party line	2.50

Measured Service.

	Per month	Excess calls, each
Single line, 125 calls	$2.50	3 cents

Coin Collecting Station.

	Per day	Excess calls, each
Two-party line, two calls per day	7½ cents	4 cents
Four-party line, one call per day	5 cents	5 cents

Extension telephones, 50 cents per month.

NAMES IN DIRECTORY.

Three times yearly a copy of directory shall be furnished each subscriber, and one copy for each extension telephone connected. For every name under a number in excess of the number of main and extension telephones installed on the premises, a charge of 25 cents per month may be made.

PRIVATE LINES.

A charge of 50 cents per month may be made for private line telephones not connected with a telephone exchange, and a charge of $2.50 per month, per mile, for private lines.

Section 3 provides that a charge of $2 per month may be made for "any telephone with unlimited service as regards messages originated and ended within the same central office, and to charge not more than 5 cents for switches outside such central office."

Section 4 states that bills are due and payable on the first day of the month following the rendering of the service.

Section 5 defines the meaning of terms used and provides that no charge shall be made for a call which is not completed. It also declares that the company must, within 30 days give service to any applicant located not more than 300 feet from a pole line or underground conduit. Subscribers may employ their own private branch operators who must, however, conform to the reasonable rules of the company. No contracts for exclusive service of one company may be executed or exacted. The reverse side of the bills shall contain a full schedule of the various classes and prices of service. A meter must be provided by the company to any business subscriber upon demand. This shall be effective for "accurately and correctly recording the number of outgoing messages and conversations," and shall be "subject to inspection at all reasonable times by the subscriber."

Section 6 prescribes the penalties enforceable against the company, its officers or agents, for violation of the ordinance. These shall be a fine not exceeding $500, or imprisonment not exceeding six months, or both.

It is believed that the ordinance will be adopted by popular vote and that, unless the courts find the rates confiscatory, it will stand all legal tests.

State Involved in Pioneer Rate Controversy.

Unless the Pioneer Telephone & Telegraph Co. voluntarily lowers its rates in Oklahoma City, Okla., to conform with the holding of the supreme court, Charles West, attorney general, probably will institute an action for contempt against that corporation, asking that a fine of $500 per day be assessed against it until the ruling of the court has been complied with. Leo Meyer, state auditor, has also been informed by the attorney general that he should pay but $3.75 per month for individual business telephones and $1 per month for extensions, the rates sustained by the court.

The Corporation Commission has also been requested by the attorney general to compel the Pioneer company to file a sworn statement of the excess charges collected on telephone service and to deposit the amount shown, to be disbursed back to subscribers. It is estimated that the total amount will be about $60,000, as the Pioneer company stated that it would amount to $1,500 per month, and the excess charges held to be illegal have been collected for forty months.

Oppose Rate Raise in Camden, N. J.

As a result of the Delaware & Atlantic Telephone & Telegraph Co.'s announcement to its subscribers of its intention of increasing rates in Camden, N. J., the city council has adopted a resolution providing for the appointment of a special committee to investigate the matter.

The Telephone Inspector and the Troubleman

The Eleventh Installment of a Series of Articles Which Deals in an Elementary Manner With Many of the Problems Encountered in the Operation of Small Exchanges—Various Pointers Regarding Pole Setting—Discussion of Joints

By A. E. Dobbs

George did not go out to the gang that afternoon, as he knew that he could depend upon Johnston to straighten up the poles, but next morning he went out to see the progress being made. I suppose everyone knows that in straightening up a pole line, it is customary for one man to go ahead to "line up" the poles both at the bottom and the top with the rest of the line, while another across the road at right angles, sights the pole until it is perpendicular, and also that the cross arms are properly turned.

"You haven't placed your pole straight, Will," remarked George to that individual who was sighting on the side.

"I got it as straight as I could. There is such a curve in that pole that I can hardly tell when it is straight."

"Got a piece of string about you?" asked George.

"I can get you one in about ten seconds," responded Will.

"Get it, as well a locknut or small bolt that can be used as a weight." Tying the weight on the string with which Will supplied him, George continued: "Here is a plumb line by the use of which you can be sure that the pole is in a vertical position. Draw your sight from the middle of the pole at the top cross arm, to the center of the pole at the ground. If you do this, you need not worry about the rest of the pole at all. You see, this pole leans back nearly a foot." George give the signal and, although the hole was nearly filled, the men managed to push the pole ahead and, by tamping hard, held it in place.

"Johnston," George went on, "you should use a plumb line also, even though you have a pretty good eye. I want these poles as nearly straight as you can get them, and you know that the unaided eye is not reliable. I think you had better line these poles from the field side because there are at least three miles of straight fencing, as these farmers run their fences by the surveyor's corner stones. Take six inches from the fence as the mark to which the inside circumference of the pole must line. By the way some of these holes will hardly take in a pole with a 12-inch butt. Do you have to dig out many of them?"

"Once in a while," replied Johnston.

"Who is in charge of the diggers, Tom?"

"Yes, but only since yesterday afternoon," replied Johnston.

"I must go ahead and see how he is doing, for we don't want your gang to do anything else but straighten up poles and tamp them in. You won't have much room for a tamping bar around this one. With 17 men at work, there must be no time lost if it can be avoided."

"Slush!" ejaculated Johnston. "These holes are not costing you more than about seven cents apiece, and we have only had to dig out about three of them since we began."

"True, but while you are enlarging a hole, there are five men standing around. Still, as you have straightened up about 40 of them since yesterday afternoon, you are making fast enough time. I have no reason for complaint, especially when I consider that you have a new gang of men without experience. You, Tom and William are the only ones who have ever climbed a pole, although you have two experienced groundmen here, and Tom has about the same number with him. Tamp the dirt all the way to the top of the ground, but you need not pile it up around the pole. I would rather have it left a little shallow, so that the winter rains will settle it down. Then, if we want it banked, we can send a man over the line in spring. Of course, I am not finding fault with your work, but just telling you how I want it done. I am well enough acquainted with you to know that you can do it as well as I."

George then went on to inspect the work of the diggers, while a short distance further along, Johnston's gang came to a few holes that were full of water.

"Fill in the dirt," ordered Johnston, "tamp it gently and force the water out over the top; throw nothing but fine dirt in the bottom of the holes. There, you have it. Move on to the next."

"Say," said Will, "that is not the way we used to set poles last summer. We used to bale out the holes, when we found water in them."

"The only reason for baling them out was that the hole sometimes caves in and leaves a deposit of mud in the bottom so that it has to be dug out again. These poles, however, were thrown in almost as soon as the holes were dug. I have seen no signs of any filling in so far, because the tamping bars reach as far down as ever."

"But the ground around them is so soft," objected Will.

"Never mind; that will settle and those poles will be as firm as any we have set, if not more so, for a pole or anchor slug that is set in water is there to stay as you would find out if you tried to dig them out six months from now. This water is only the result of the rain last night and the ground will dry out in a couple of days. It is not permanently wet like the Buck Creek marsh, where we have a different condition to deal with."

Line Connections.

A few days before they were ready to begin stringing the copper wires, Johnston asked George where the sleeves were for splicing. He was informed that they were on the way and would probably arrive the next day. George remarked that he had delayed ordering them as he rather favored the twisted wire splice, but had finally decided to use the sleeves.

"We used to consider it rank heresy," said Johnston, "to make ordinary telegraph connections on copper wire. Did you intend to solder them?"

"I was figuring on three-wire splices," replied George, "but changed my mind for various reasons."

"Do you consider them as good as the sleeve connectors?" queried Johnston.

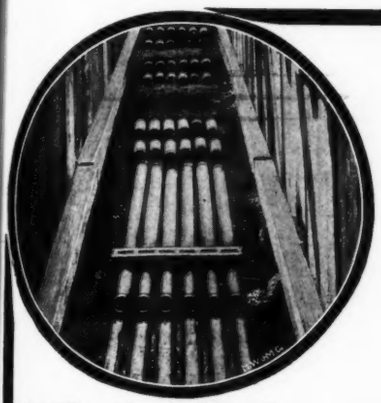
"Sure, or even better under certain conditions," was the reply.

"I'm from Missouri!"

"Did you ever make any tests yourself to learn about them?"

"No."

"I thought not," went on George. "Now I have made tests of all kinds of these different connections, even on iron wire so rusty that it had to be taken down, and I never yet found a well made joint that needed solder or that would be improved by means of solder. On the other hand, I have seen many a joint where solder, on account of the acid used as a flux, resulted in a more rapid rusting out, because the acid attacks the zinc coating of the wire. So far as sleeves are concerned, there is this to be said in their favor:



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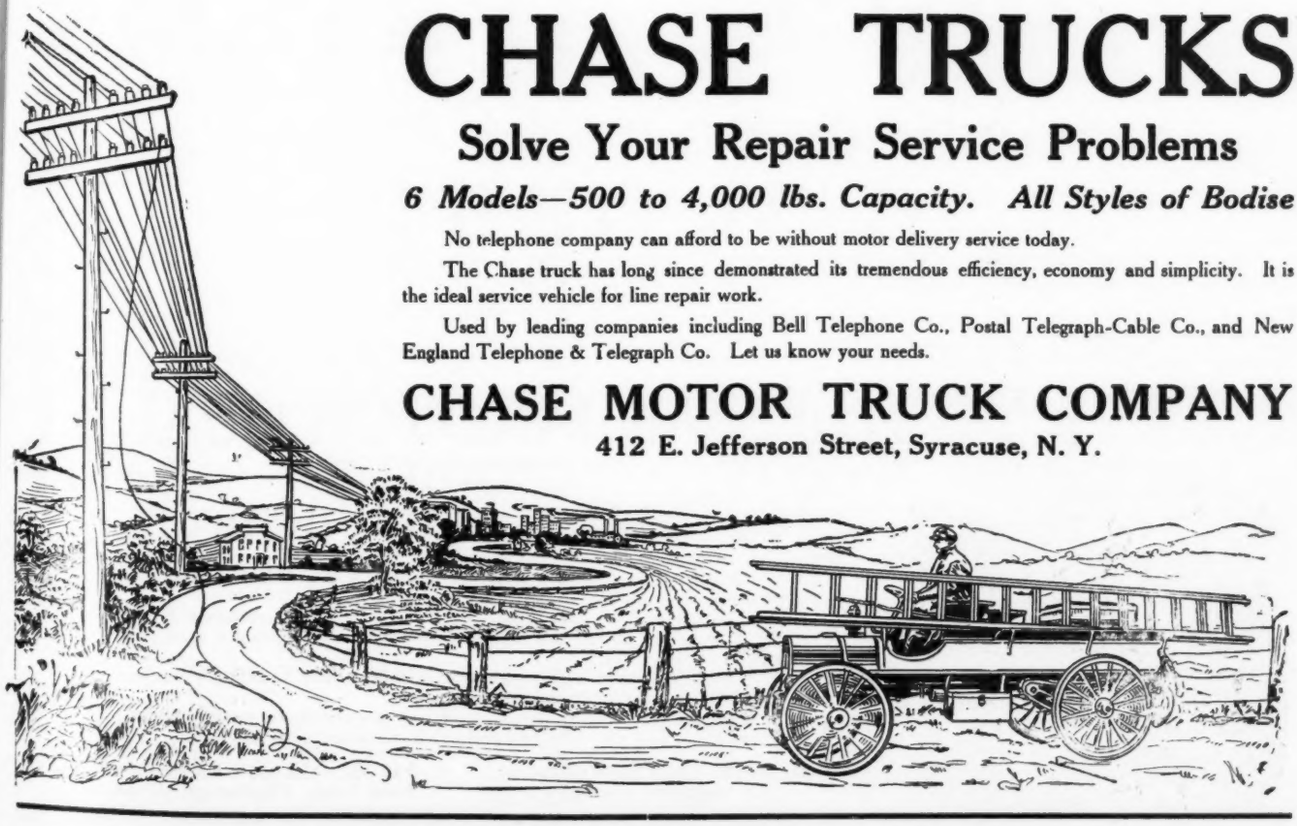

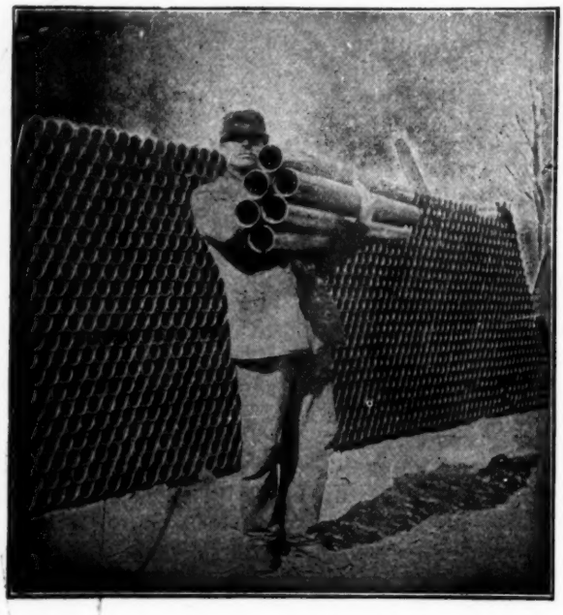

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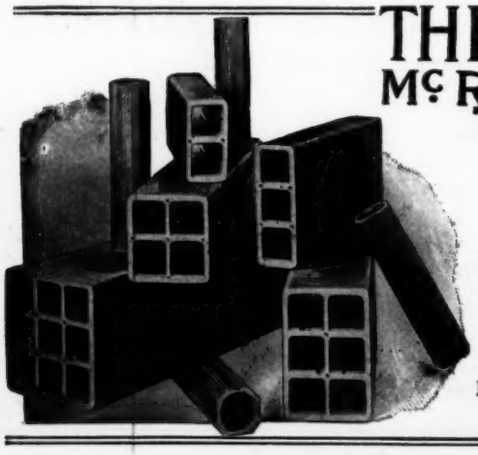

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"Third, there is time saved by their use, as it only takes about ten seconds to make a connection.

"Fourth, they always insure a good contact between the two ends of the wire and the contacts are always bright beneath the sleeve tubing.

"As to the first advantage," he continued, "a foot and a half of No. 10 B. & S. copper wire at the present time costs about three-quarters of a cent, while the sleeves cost more than twice that amount; as to the second, the line end of the wire will not be scratched or nicked if the men are at all careful; regarding the third item, two three-wire joints can be made while the men are walking from one pole to another, so as there is really no time lost; to the fourth I would say that a three-wire joint possesses a lower resistance than a sleeve connection for the reason that in a sleeve, the contact is from one wire to the sleeve and thence to the other wire, a double contact for each joint. In a three-wire connection, we have not only the direct contact between the two wires but the added contact of the third wire against both; besides this joint is stronger than a sleeve. But there is always the danger of oxidization with this type of joint, thus forming a high resistance joint."

"According to your arguments," spoke up Johnston, "the twisted three-wire joint is better than the sleeve, so I should like to know why, if sleeves are not a good thing, do nearly all of the long distance companies use them?"

"Because they have many gangs employed and do not wish to take any chances," responded George. "They well know that many of their men have a disposition to slight their work or not do it properly and they hope in this way to secure a greater uniformity in their line connections. That is a trouble I was afraid of on this line."

"Have you any figures as to the average resistance of line joints without solder?" asked Johnston, who had become interested in the matter of joints.

"I did have some I put down in a note book a few years ago," responded George, looking through the papers in the desk he had made from a box on one of the rainy days.

"Here they are," he continued, taking up and opening the book. "The resistance of a three-wire copper joint varies from .004 to .007 of an ohm; a sleeve connection, .010 to .012 of an ohm; an iron wire joint, .012 to .015 of an ohm when new, and about .025 of an ohm when the line is pretty well rusted. So you see, even at the highest figure, it takes some forty joints to increase the line resistance one ohm. With the highest resistance given for copper joints, 1,000 of them would have a resistance equivalent to that of 7,000 ft. of No. 10 B. & S. wire."

(*To be continued.*)

Texas on Record Against Commission Control.

As briefly stated in TELEPHONY, the Texas Independent Telephone Association, at its recent convention, went on record as being opposed to the creation of a public utilities commission in that state. In his talk on the subject, J. B. Earle, of Waco, the new president, thus defined his reasons for this stand:

"One or two of the Bell officials have indorsed the idea of a Texas public utilities commission, to regulate telephone charges, to regulate the matter of the organization of telephone companies, and to determine as to whether or not there should be two telephone companies in any community, and if so, upon what conditions, when and where. I judge that that would be the scope of their authority.

If we had a system complete and had our toll lines complete, it might be a good thing for us then, but such is far from the case.

One of my first objections to commission regulation is that it prevents further development among Independent systems. Where the field is already occupied by one system, the commission will undertake to force the company occupying the field to meet public requirements rather than allow a new company to come in and divide the business. When a new company would seek admission to a territory already occupied, the old company would go to the commission, saying, 'I will do what you request; if my service is not satisfactory I will improve it. If I am not reaching the people, I will get the material to do so,' and thus it will try to defeat the other company.

If any man, be he Independent or Bell, has a telephone system that does not meet the demand of the people, competition ought to be allowed to come in. My experience is, where there is competition, there is service, and where competition is not, there is not such good service."

The resolution adopted by the convention, which endorsed Mr. Earle's views, was as follows:

"RESOLVED that the Texas Independent Telephone Association, in convention assembled, enters its protest against the creation of a public service commission, because it has proven a menace to the proper development of the telephone business and is absolutely ruinous to the smaller companies and

RESOLVED further that this association send a committee to the next session of the legislature to protest against this kind of legislation."

The text of the resolution protesting against the present scheme of taxation in the state, which, it is declared, discriminates against telephone companies, was as below:

"WHEREAS, the telephone properties are taxed in Texas much higher than are any other properties in the state and the constitution and laws of the state provide that taxes shall be equal and uniform. Therefore be it

RESOLVED that we do hereby earnestly invite the attention of the governor of the state and the members of the legislature to this unjust discrimination, and respectfully request that justice and equity in the matter of taxation, which a great state and a great people can afford to extend to every interest in Texas, be extended to the telephone interests.

RESOLVED further that a commiteee attend the next legislature and urge a correction of this injustice."

TRANSACTIONS OF CANADIAN CONVENTION.

(*Continued from page* 790.)

With a view to overcoming this difficulty, the following resolution was adopted, on motion of A. Denholm, seconded by F. S. Scott:

"RESOLVED That the Dominion parliament be asked to enact that, when a company with a Dominion charter enters into a contract with a company holding a provincial charter to do the switching for the latter company, the first-mentioned company shall at once come under the jurisdiction, rates, and regulations enacted by the provincial authorities in so far as the said switching agreement is concerned, and as it relates to interchange of service between systems under the jurisdiction of Ontario."

In view of the fact that a special committee of the legislature for the revision of the provincial statutes will meet at an early date for the purpose of considering assessments, the convention appointed a committee, consisting of F. D. Mackay, G. W. Jones and E. E. Wilson, to meet the legislature's committee, with a view to obtaining changes in the assessment act as relates to telephone lines. Some of the members of the association were disposed to consider it unwise to request a change in the present law, but the committee which was appointed was empowered to take whatever action it might deem in the best interest of the Independent companies as a whole.

The following officers were elected: Honorary president, W. Doan, M. D., Harrietsville; president, G. W. Jones, Port Hope; vice-president, Andrew Denholm, Tara; secretary-treasurer, Francis Dagger, Toronto.

The Propagation of High Frequency Along Wires

Some Practical Aspects of High Frequency Multiplex Telephony and Telegraphy—Its Relation to Radio-Telegraphy and Radio-Telephony—Advantages Over Existing Telephone Systems—Reprinted from The Journal of the Franklin Institute—Last Instalment

By John Stone Stone

The absence of distortion and the silent line of the new telephony remove the chief obstacle to the use of the telephonic amplifier at or near the receiving end of a long line to compensate for the weakening effects of attenuation on the current. In this connection it is to be noted that in the existing system, when a telephone current has been

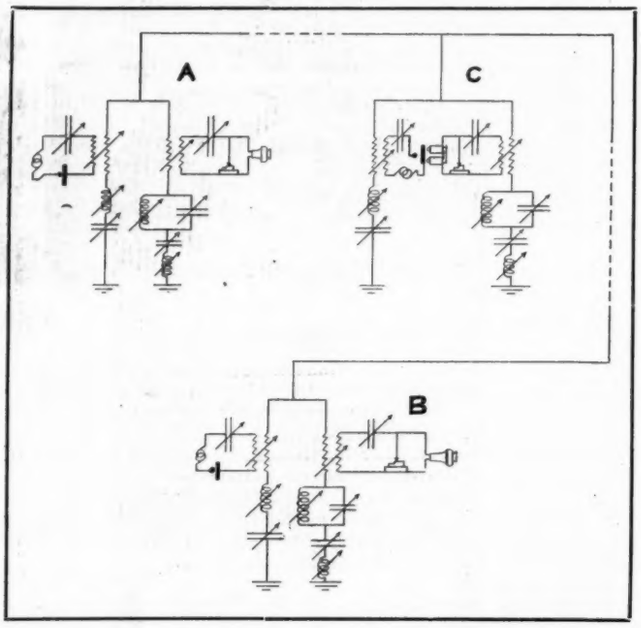

Fig. 7. Circuit with Telephone Amplifier for Two-Way Transmission.

sufficiently attenuated in passing over a long line to require amplification, it is also so distorted, and so intermixed and confused with line noise currents which the amplifier would bring out or intensify that a telephone relay for amplification purposes, no matter how perfect it might be it itself, has by some engineers long been regarded as of little value. Another influence which has militated against the utility of amplifiers in telephony in the past is that for two-way transmission, the amplifier has a persistent tendency to sing to itself in much the same manner and for much the same reason that a telephone receiver sings to its transmitter when it is held in front of the mouthpiece of the latter, if the efficiency of the combination is sufficiently great.

The greater the amplifying power of the telephone relay, the more persistent this tendency to sing to itself, and to overcome it resort has been had to so-called telephone relay circuits, which seek to exclude the current developed by the transmitter element of the amplifier from its receiver element. These telephone relay circuits are essentially induction balances in which the transmitter and receiver elements of the amplifier are in conjugate branches and the line wire forms one or more arms of the balance. In the case of an amplifier that really amplifies, the least change in the line conditions upsets the balance sufficiently to set the amplifier singing to itself and, even in the case of constant attention on the part of a skilled operator, this, at least temporarily, causes an interruption of service. In high frequency telephony no such restraining conditions operate against the use of amplifiers for two-way transmission, since the current from the transmitter element and that directed to the receiver element are of different frequencies and the receiver element is placed in a branch or local circuit adjusted to exclude the current from the transmitter element, irrespective of the conditions of the line.

Fig. 7 shows a typical arrangement of a telephone amplifier adapted for two-way transmission in a system of high frequency telephony.[20] In it the transmitters and receivers are the same as those already shown and described, and at the amplifier station *C*, the transmitter and receiver elements are the same as the transmitters and receivers shown at *A* and *B*. In such a system the transmitters at both stations *A* and *B* develop currents of the same frequency, this frequency being that of the current to which the receiver element of the amplifier is responsive, while the receivers at both stations *A* and B are selective of currents of another frequency, this second frequency being that of the current developed by the transmitter element of the amplifier.

It is not the intention here to imply that the existing telephone amplifiers are all that could be desired, but the author believes that he is not alone among telephone engineers in holding the view that the disrepute into which these instruments have fallen is due in a very large measure to the disabilities which they suffer when an attempt is made to fit them into the existing system of telephony, a system to which, as has here been shown, the telephone amplifier is ill adapted.[21]

The most serious obstacle to the successful use of the new high frequency telegraph and telephone is undoubtedly the excessive attenuation or progressive weakening of its current as it flows along the line, particularly in cable circuits. Unless countervailing or remedial conditions can be found, the use of these high frequency systems must be very materially restricted through being confined to relatively short lines.

The average frequency of the ordinary telephone current is about 800 cycles per second, but the highest harmonics range between 4,000 and 5,000 cycles, and it has been found that it is necessary, for the complete clearness of articulation of the transmitted speech, to conserve harmonics up to about 1,500 cycles.[22] The highest useful frequency in ordinary telephony is, therefore, about one-tenth of the lowest frequency which Major Squier's experiments seem to indicate as possibly practicable for the new telephony, and about one-seventieth of the highest frequency regarded as practicable by Major Squier for the new system. In making comparisons of the attenuation in the old and new systems these ratios should be borne in mind.

Since in the new system of telephony a greater current is thrown on the line than in the existing system, and since, further, a receiver of very much greater sensibility is em-

[20] See U. S. patents to J. S. Stone Nos. 717,515 and 717,467, both of Dec. 30, 1902.

[21] A new telephone relay amplifier has recently been discovered which is entirely electrical in its action, having no moving parts whatever. It is productive of great amplification, and it appears to do this without appreciably distorting the telephone current.

[22] See B. S. Cohen, Phil. Mag., Sept., 1908; also Proc. Phys. Soc. London, vol. xxi.

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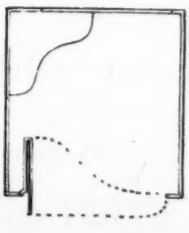

ployed, evidently a considerably greater attenuation of the current of the system is permissible than could be tolerated in the old system. When further, the absence of noise, the absence of distortion, the absence of side tone, and the absence of reflection of energy from the receiving end of the line are taken into consideration, it seems conservative to estimate that the maximum practical permissible attenuation length in the new telephony is 6.9, as compared with 4.6 in the existing system. An example of how this affects the range of transmission of the new system may perhaps be best gathered from a concrete example, and for this purpose an open wire telephone line construction will be chosen, which is of a type in most common use in the United States for transmission to distances up to 450 miles.

This line is of the two-wire or so-called metallic circuit type, in which the wires are of hard drawn copper 0.104 inch in diameter, and are separated on the cross arms by a distance of 12 inches. Assuming for this line an insulation resistance of one megohm per mile, the ratio of the attenuation constant for currents of 1,500 and 100,000 cycles per second respectively is very closely three, and, other things being equal, this would mean that the new system could not be used to transmit speech over more than 150 miles of such a circuit. On the basis of an attenuation length of 6.9, however, it would seem that practical transmission of speech by the new system could be had over a length of 225 miles of this circuit. The disparity between the distances to which unaided transmission may be had by the existing and the new system is somewhat greater in the case of open wire circuits of larger than of smaller wire, and this disparity is, in general, greater in the case of cable circuits than in the case of open wire circuits.

Even if no effective means be found to extend the range of the new high frequency telephony, few will seriously contend that there is no practical gain to be realized in making use of a 450-mile circuit as it is at present used and further simultaneously employing it in two sections, each 225 miles in length, for the multiple transmission of, say 42 messages, 21 on each section.[23]

Before leaving the subject of the attenuation of high frequency waves propagated along conductors, it is worth while to note that the expressions for the attenuation constant and the wave length or wave speed on copper open wire circuits is much simpler than it is in the case of waves of lower frequencies, and the reader will find that he may easily compute the attenuation and wave length or wave speed in the case of any given circuit.

The complete expression for the attenuation constant per centimetre of a uniform unloaded circuit is

$$\alpha = \left[\tfrac{1}{2} \left\{ (R^2 + L^2\omega^2)^{\frac{1}{2}} (S^2 + C^2\omega^2)^{\frac{1}{2}} + (RS - CL\omega^2) \right\} \right]^{\frac{1}{2}}$$

in which expression R, L, C, and S are the resistance, inductance, capacity, and leakage conductance respectively, all in absolute electromagnetic units per centimetre, and ω is the periodicity or 2π times the frequency of the waves.

Making use of the relation $CL = \frac{1}{v^2} + \delta C$,

in which v is 3×10^{10}, writing a for $\frac{R}{L\omega}$ and b for $\frac{S}{C\omega}$ the expression for a becomes

$$\alpha = \left[\frac{(1+\delta C v^2)\omega^2}{2v^2} \left\{ (1+a^2+b^2+a^2b^2) \right\} \right]^{\frac{1}{2}}$$

But $a^2 b^2$ is negligible compared to unity, $a^2 + b^2$ is small compared to unity, and so also is $\delta C \nu^2$. Consequently, by the use of the approximation

$$(1+\delta)^{\frac{1}{2}} = 1 + \frac{2}{\delta}, \text{ where } \delta \text{ is small compared to unity,}$$

the expression for a reduces to

$$\alpha = \frac{\omega}{2v} \left(1 + \delta \frac{Cv^2}{2}\right)(a+b)$$

The complete expression for the wave length in centimetres is

$$\lambda = \frac{2\pi}{\beta}$$

where

$$\beta = \left[\tfrac{1}{2} \left\{ (R^2+L^2\omega^2)^{\frac{1}{2}} (S^2+C^2\omega^2)^{\frac{1}{2}} - (RS - CL\omega^2) \right\} \right]^{\frac{1}{2}}$$

For high frequencies this reduces to

$$\beta = \frac{v}{\omega} \left(1 + \delta \frac{Cv^2}{2}\right) \left\{ 1 + \frac{1}{8} \left(\frac{S}{a-b} \right)^2 \right\}$$

The velocity of propagation of the waves is $V = \frac{\omega}{\beta}$ in centimetres per second.

To express the attenuation constant a and the wave length constant β in terms of miles instead of centimetres, they may be multiplied by 160,934.4, the number of centimetres in a mile.

In the above expressions $C = \frac{1}{4v^2 \log_e \frac{d}{r}}$

where d is the distance between the two wires of the circuit in any units and r is the radius of the wire in the same units.

$$L = \frac{1}{Cv^2} + \delta$$

$$R = R_{\omega=0}\left(1 + \frac{k^2}{48} - \frac{k^4}{2880} - \cdots\right)$$

where $R_{\omega=0}$ is the resistance of the wire to low frequency or direct currents and

$$k = \frac{nc^2}{\rho}$$

where n is the frequency of the waves, c is the circumference of the wire, and ρ is the resistivity of the material of the wire in absolute electromagnetic units per centimetre.[3] For hard drawn copper at 75° F., ρ may be taken as 1748.

When k is large, say at least equal to 6, then the simpler expression $R = R_{\omega=0}\left(\tfrac{1}{2}\sqrt{k}\right)$ may be used:

When k is less than 8,

$$\delta = 1 - \frac{k^2}{96} + \frac{13k^4}{69120} - \cdots$$

and when k is greater than 8,

$$\delta = \frac{2}{\sqrt{k}}$$

One megohm per mile makes $S = 6.214 \times 10^{-21}$ absolute electromagnetic units per centimetre.[3]

Except for the development of these new simplified expressions for a and β, the mathematical theory of the subject of electric wave propagation on conductors has been so exhaustively treated elsewhere as to need no restatement here.

The reader who wishes to pursue this mathematical theory for the sake of its intrinsic beauty and interest can do no better than to consult the works of the great master of the subject,

[23] The number of stations which can be used in any given case is the nearest whole number to

$$1 + \frac{0.82393}{\log_{10}(1+\Delta)}$$

where 100Δ is the least percentage permissible between frequencies. The number of stations assumed in the above example is on the basis of a 10 per cent. difference between the frequencies.

Oliver Heaviside, whose collected papers are entitled "Electrical Papers" and "Electromagnetic Theory." He will find these works to be a rich mine of information on the subject. He will also find that the similarity of these books to a mine extends to the method by which he will have to extract his information from them. A much simpler and more concise though more restricted and utilitarian discussion of the subject is to be found in Prof. J. A. Fleming's book, entitled "The Propagation of Electric Currents in Telephone and Telegraph Conductors," which brings out, perhaps more clearly than any other of his numerous writings, Professor Fleming's unusual powers of simple and clear exposition of technical subjects of exceptional complexity—a quality the more to be admired because of its rarity in English technical and scientific writings.

In the existing system of telephony, when it is necessary to diminish the attenuation on a line without increasing the size of the wire used or the separation between the wires, resort is had to methods of diminishing the attenuation constant by diminishing the quantity a, this being done by adding inductance to the line without producing a proportionate increase in its resistance. A circuit so treated is said to be "loaded" with inductance and is called a "loaded" circuit.

Two methods have been used. In one the added inductance is uniformly distributed along the line and is secured by wrapping the insulated wire with a winding of iron wire. This method of loading cables has found favor in Germany and Holland.[24] In England, France, and the United States, the only method of loading telephone lines used is by means of a system variously ascribed to M. I. Pupin,[25] to G. A. Campbell,[26] to Sylvanus P. Thompson,[27] and last, but by no means least, to A. Vaschy.[28] In this *multi-patratus system* of loading lines, inductance coils having time constants $\frac{L_1}{R_1}$ larger than the time constant per unit length of the unloaded line $\frac{L}{R}$ are introduced in the circuit at equal intervals, small compared to one-half the wave length of the highest frequency component of the telephone current to be conserved in transmission.

[24] "Moderne Telefonkabler," by C. E. Krarup, Elektroteknikeren, Dec. 10, 1904. "On Submarine Cables for Long-distance Telephone Circuits," by Major O'Meara, Jour. Inst. Elect. Eng., London, Nov., 1910. U. S. patent to J. S. Stone, No. 578,275, of March 2, 1897.

[25] "Propagation of Long Electrical Waves," by M. I. Pupin, Trans. A. I. E. E., March, 1899. "Wave Transmission over Non-uniform Cables and Long-distance Air Lines," by M. I. Pupin, Trans. A. I. E. E., May, 1900.

[26] Records for Pupin & Campbell in interference in the U. S. Patent Office No. 20,699, also Phil. Mag., vol. v, p. 319, March, 1903.

[27] "Ocean Telephony," by S. P. Thompson, Trans. Int. Elect. Congress, 1893; also English patents Nos. 13,064 and 15,217 of 1893.

[28] A. Vaschy's numerous mathematical discussions bearing upon this subject are to be found in Annales Telegraphique 1888, '89, in his Électricité et Magnétisme, and in L'Éclairage Électrique 1897, and elsewhere.

[29] The effect of dissipation of energy in the iron wire wrapping is to increase the effective or apparent resistance of the copper conductor. Thus in the Seeland-Samso-Jutland cable, which is about 20 nautical miles in length and is uniformly loaded by iron wire wrapping, the inductance is increased 868 per cent., and the apparent resistance to a current of 900 frequency is 5 per cent. greater than to a direct current. What proportion of this increase in the effective resistance of the copper conductor is due to hysteresis loss in the iron wrapping is as yet undetermined. If it were wholly due to hysteresis, then it would be approximately 550 per cent. at 100,000 frequency, but probably not more than one-half of the increase in effective resistance of the copper conductor is due to this cause. The remainder is due to the unequal distribution or the imperfect penetration of the alternating current into the copper wire.

The method of loading lines by uniformly distributed added ferric inductance would seem, on its face, to be available for the high frequency systems of telegraphy and telephony, but it suffers from several disadvantages. In the first place, it is ill adapted for open wire circuits; in the second place, it renders cables excessively heavy and bulky; in the third place, it is

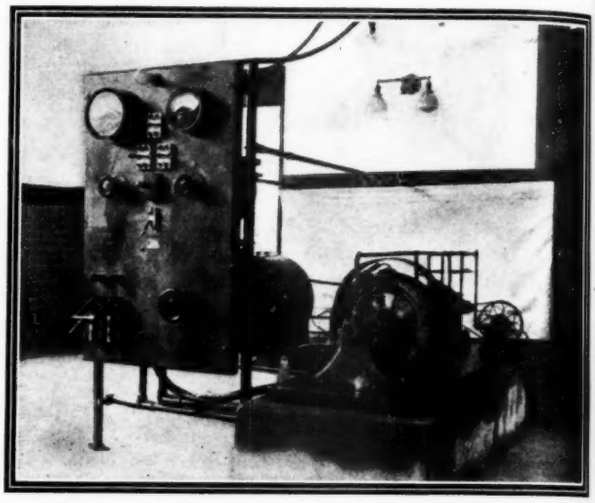

Fig. 8. Alexanderson High Frequency Dynamo and Switchboard.

impossible to predetermine the attenuation constant of such a circuit; and, in the fourth place, there is evidence tending to show that when a cable so loaded is used in connection with high frequency currents, the dissipation of energy due to hysteresis in the iron wrapping will largely, if not wholly, compensate the beneficial effects of the increased inductance of the circuit.[29]

The use of the second system of loading lines would seem to be precluded by the expense involved. The number of loading coils used would have to be about 70 times as great for the 100,000 frequency current of the new system as is now used on the basis of approximately 4.5 coils per wave length for a current of 1,500 frequency.

Since, for equal degree of loading of the line in the new and the old systems, the inductance of the coils used for currents of 100,000 frequency would be but one-seventieth of that of the coils used in the old system, it might at first glance seem as if the coils would be correspondingly cheaper and that, consequently, the disparity in the cost of loading the line in the two systems would result chiefly from the greater cost of labor in installing the more numerous coils in the case of the new system. But this conclusion is not justified, because the time constant of the coils in the case of the new system must be as great as in the older system, and the bulk, weight, and cost of coils depend far more on their time constants than on their inductances.

So far from these systems of loading lines with inductance holding out hope of improving the range of high frequency telegraphy and telephony, the very fact that many trunk circuits are already loaded with coils for the improvement of the existing system bids fair to interfere with the extension of the high frequency system to these lines. In order to apply the high frequency system to a line which is loaded for the existing system, it becomes necessary to shunt the loading coils by condensers which shall act practically as a short circuit to the loading coils for the high frequency currents and which shall act practically as an inappreciable shunt to them for the low frequency telephone current. The cost and inconvenience of this would probably not offset the advantages to be gained from the increased effective number of circuits secured. However this may be, it is a fact that, so far as can be seen at present, the high frequency system will not be applied to

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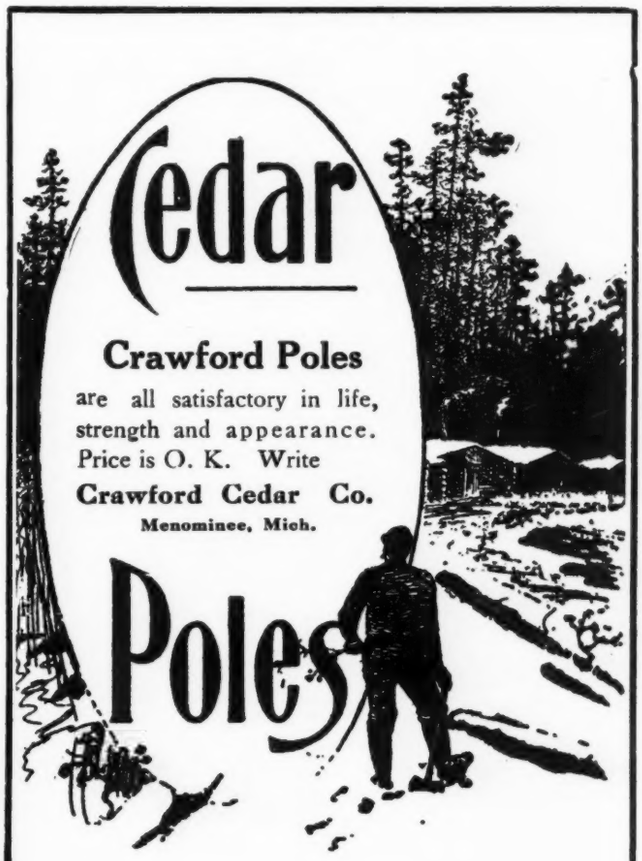

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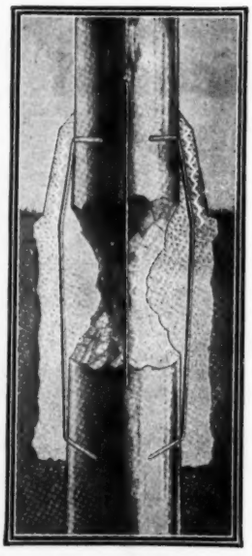

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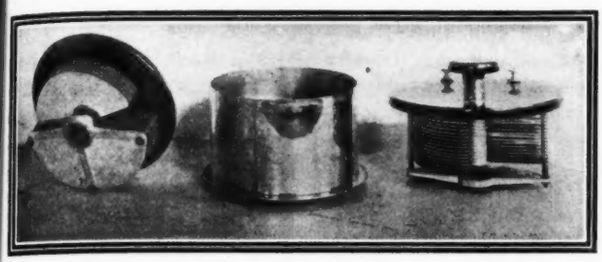


Fig. 9. Type of Condenser Used In New System.

In the latter half of this paper the new system has been treated more particularly in reference to its application to trunk lines. The promise it holds out of a 20-party substation telephone line with not only selective calling but selective or multiple speech transmission may to some, in itself, seem sufficient to justify the money that has been expended and the patient, unrequited human effort that has been freely given in bringing the new system to its present state of development and to warrant the further effort and expenditures which will be necessary before it can yield its full service to society.

REPORT ON CHICAGO BELL COMPANY.

(*Continued from page 804.*)

stalled in the offices. Furthermore, it is assumed that a certain number of subscribers will be obtained as soon as this equipment is ready for service, and at that time the substation equipment will be provided. During a later year additional offices will be constructed and additional units will be installed in the offices already partially equipped.

An additional item of expense, which is a part of the cost of securing business, is included in this schedule at this point, representing the cost of securing subscribers and printing the first issue of the directory, which amounts, as shown by study of the present operating statistics, to be slightly over $4 per subscriber, and the total obtained by multiplying the total number of subscribers by this amount, is included in the proper column in the table.

The schedule thus arranged provides for the completion of the entire property within five years. The amount expended during this time is the amount shown in the appraisal exclusive of carrying charge. It has further been assumed that that company has a right to earn a fair return on the amount of money invested, and during any given period on the schedule after the first period a return has been figured on the investment at the end of the preceding period."

The appraisers give further explanations and elaborate computations to show how, if a company started a new plant in Chicago today, with a field clear from competition, it would cost $7,000,000 to develop the business of the present company. In other words, the appraisers are seeking to estimate what is usually considered a form of "going value" based on a 10 per cent. return on the investment in the developing plant. Byllesby and Arnold prefer to call this by another name. It is the idea rather than the name that is important.

The theory assumes, although it does not directly state, that the people of Chicago are to forget their knowledge of telephones and must be solicited, at much expense, in order to become acquainted with them. To imagine such a condition of sudden collapse of memory in this or any other city might be natural to builders of air castles or to the well-nigh extinct type of pure theorists among college professors who have been so much of a butt of ridicule among "practical men," but it seems curious when coming from prominent engineers. If Chicago were suddenly bereft of all telephone service by a San Frisco earthquake or some other catastrophe, the present subscribers would need no soliciting to resume the service at the very earliest possible moment. Indeed, one of the notable features of Chicago telephone history has been the almost entire absence of expense for soliciting of new business. In this respect it more closely resembles the street railway than the lighting utilities.

It is indeed true that without business the physical plant would only have a scrap value. The cost of construction of the plant, even if it be $40,000,000, would not give value without a demand for the service. In assuming a demand sufficient to give a value equivalent to the cost of the physical property, a certain type of going value is thereby generally conceded.

If the courts shall insist upon allowing public utilities a further value beyond the investment, our public service commissions are likely to reduce the rate of return correspondingly, leaving to the companies but little more than just enough to escape the charge of ordering a confiscatory rate.

The United States Supreme Court, after listening to able arguments on behalf not only of good will but of going value in the Consolidated Gas case of New York in 1898-9, and in the Cedar Rapids gas case in 1912, entirely ignored the claim, while in the Knoxville water case, decided January, 1909, the court allowed it, but distinctly stated that it was not to be considered a precedent.

None of the six prominent public utility commissions of Massachusetts, New York, Wisconsin, New Jersey and Maryland have so far allowed any going value, except in Wisconsin, and there only where, in the long run, the dividends in the past have not appeared to the commission to be fair and reasonable. No such claim of lack of good dividends in the past can be made here.

(*To be continued.*)

Pacific Telephone Financing.

It is understood that arrangements have been made for the paying off of the $5,000,000 two-year 5 per cent. coupon notes of the Pacific Telephone & Telegraph Co., which mature on January 5 next. It was reported that the company would take up these notes by the issuance of new one-year notes, but such a plan, if contemplated at any time, has been abandoned. The company also has $750,000 first mortgage 6 per cent. bonds of the Sunset Telephone & Telegraph Co., which mature on July 1, 1913. These bonds, however, it is said, will be taken care of by the sinking fund, in which there was, on February 1, 1912, $661,906.

The company also has $2,250,000 Sunset Telephone & Telegraph Co. consolidated mortgage 5 per cent. bonds that are due on October 1, 1929. These bonds are callable on October 1, 1913, at 105, and it is generally believed that the company intends to exercise its option.

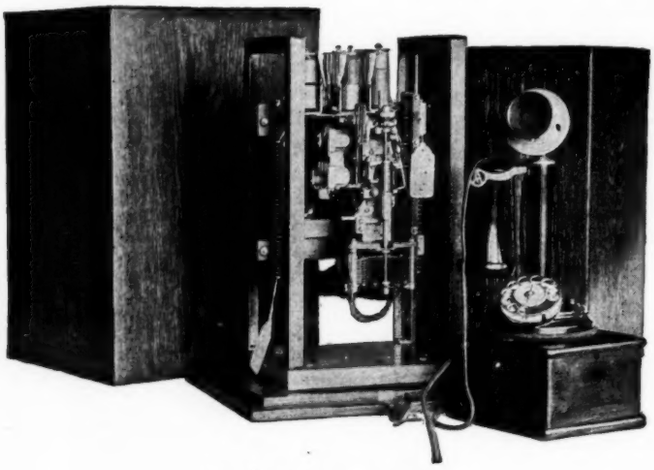
Commercial Club to Investigate Rates.

Telephone rates in Wenatchee, Wash., will be investigated by the trade extension committee of the Wenatchee Commercial Club. The whole "upper country" is said to be suffering imposition on the part of the Pacific Telephone & Telegraph Co. The committee will confer with the company and ask for immediate relief.

From Factory and Salesroom

Raven Brand Supplies.

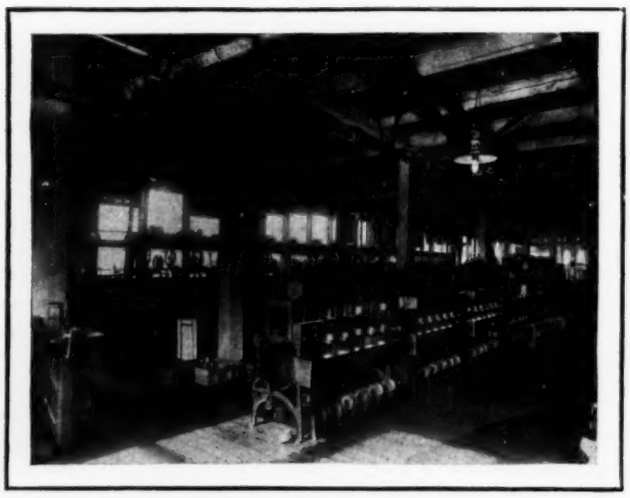
"Success comes from knowing what the other fellow wants and from offering him products that he would make for himself if he had the facilities," says Elsworth Keith, manager of the supply sales department of the Automatic Electric Co., Chicago. Mr. Keith had a hard task on his



Automatic Monitor System.

hands, organizing and developing this branch of the company's business. But he realized the possibilities, and has held fast to the belief that it was possible for his company to make a line of good supplies which would be equally as successful as the company's automatic equipment.

Mr. Keith goes on to say that before they actually decided on the type of cords they were going to make, they wrote many companies soliciting opinions, advice, etc., as to what constituted a good cord. A trade mark and guarantee are placed on the cords because of the Automatic



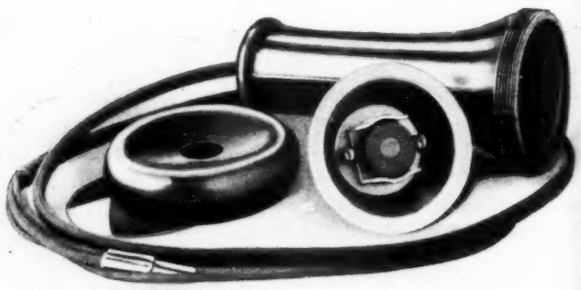
Wire Making Machines in Automatic Factory.

company's faith in them. Raven Brand cords are, consequently, not only trade-marked—being distinguished by means of a black tracer thread—but are said to be a composite of all the features desired in a good cord.

It is claimed that Raven Brand cords are very flexible, well made, will last long and withstand hard usage, owing to being substantially reinforced. As for conductivity, the copper tinsel used, assures clear transmission always. The Raven Brand line of cords comprises cords, receivers, desk set and switchboard use. In the factory will be found the latest and best machinery and Mr. Keith advises they have a production engineer who is constantly endeavoring to keep manufacturing costs at the minimum. Herewith is presented an illustration of the company's wire machines.

But to Raven Brand cords can not be attributed all the credit for the progress of this department. The automatic monitor system is also deserving of mention. This is a practical device, the result of suggestions received from operating companies for some method of secretly and efficiently monitoring the work of operators.

The manager of any telephone company using this apparatus may, without the knowledge of operator, secretly investigate or monitor her, thus determining her efficiency. The knowledge has the result of energizing the operators and of making them more careful, as they do not know at what moment or time their work may be investigated. The mechanism is very simple, being comprised of an automatic telephone, a push button, and the necessary switches. The operator of any exchange can be called by merely turning the dial on the telephone. Mr. Keith says this system has made a big hit wherever it has been installed and that he is highly gratified at the several good sized orders recently received.



Automatic Electric Direct Current Receiver.

The direct current receiver is another one of the supply department's specialties and this has also had a good sale. It dispenses with the use of permanent magnets, as it utilizes the transmitter direct current for establishing a normal magnetic field. The instrument is of very simple construction and possesses few parts, these being readily interchangeable. An induction coil is not used in connection with this type of receiver, consequently there is no loss in the voice currents in transforming by induction. Thus, the full benefit of all current is obtained in the receiver.

In recent comparative tests made between New York and Chicago, and Freeport, Ill., and Chicago, it is said that its clearness of reproduction was conclusively demonstrated.

Literature describing any one of the propositions in the foregoing will be gladly sent to every telephone company requesting it. All mail should be addressed to the Supply Sales Department, Automatic Electric Co., Chicago.

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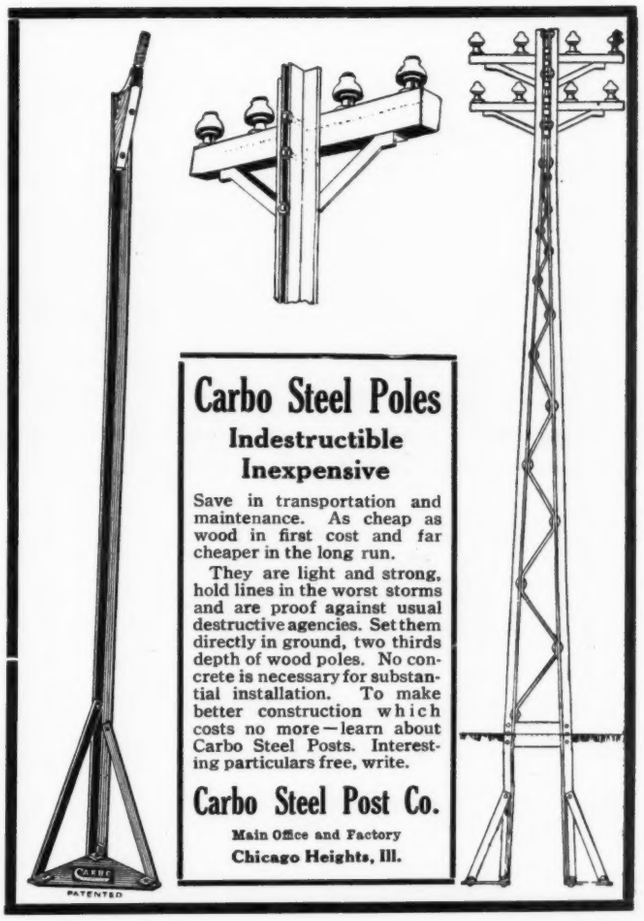

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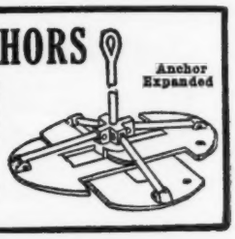
N. Y. GROUND CLAMPS

"FIT ANY SIZE PIPE"—4 TYPES

CAMERON APPLIANCE CO.
56 Waters Ave. Everett, Mass.

EVERSTICK ANCHORS

Have the greatest holding power. More "Eversticks" used than all other patented anchors. *There's a reason.* Write for literature.



Everstick Anchor Co.
ST. LOUIS, MO.

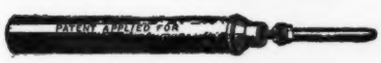
CEDAR POLES

AND CROSS ARMS

LOWEST PRICES—PROMPT SHIPMENTS

Wm. Mueller & Co., 920 Postal Telegraph Bldg.
Established 1862. - - - - CHICAGO

POT END HEAD



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Bonding Clamps
Cable Tap
Good Luck
Terminal
Cable Hangers

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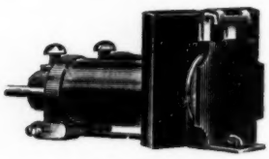
Beck Bros.

Manufacturers of Electrical Testing and Measuring Apparatus

Send for Literature

210 N. 2nd St. **Philadelphia, Pa.**



Telephone and Switchboard Repairing

You can have your **plugs, jacks, keys, drops,** etc., **repaired** and made like new, at a **saving in cost** to you over new apparatus.

With our up-to-date tools and machinery, including all of the equipment of the old Sterling Electric Company, we are qualified to do all kinds of **telephone** and **switchboard repair work** and to furnish the **highest grade** of **repair parts** and **apparatus** at reasonable prices.

We solicit your inquiries for repair parts, special apparatus, etc.

Lafayette Electric & Mfg. Co.

Lafayette, Indiana, U. S. A.

For that cable joint exposed to dampness use Neponset Splicing Compound, it's weather-tight.

For that temporary joint which may have to stay in service a long time use Neponset Splicing Compound, its strength is equal to that of the original covering.

For that joint likely to cause electrical fires use Neponset Splicing Compound, it has unexcelled dielectrical strength and adhesiveness.

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L & N Lineman's Fault Finder

THE LEEDS & NORTHRUP CO.

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¶ The **L. & N. Portable Testing Sets** are convenient instruments for the measurement of resistances and the location of faults. Our Lineman's Fault Finder is a simple, reliable and inexpensive instrument for these purposes. May be used for locating faults, crosses, opens, etc., on telegraph and telephone lines. Also for measuring conductor and insulation resistance.

May we send you details?

Electrical Measuring Instruments

Please tell the Advertiser you saw his Announcement in TELEPHONY.

list among its customers. This is known as the "Bargain News Bulletin." The first was issued October 30, and the second appears this week.

This is a four-page folder giving full descriptions and illustrations of some of the earlier types of apparatus of the Stromberg company manufacture, together with the bargain counter prices at which they are offered. The foreword on Bulletin No. 1 explains the reasons for this step, as follows:

"During our tenure as Independent manufacturers of high grade quality telephone apparatus, we have designed and built many different types of telephones and telephone equipments.

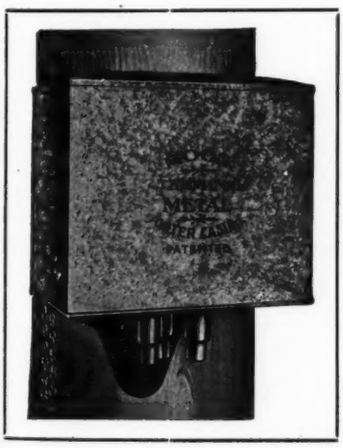
With the rapid advance of Independent telephony, equipments that were the standard last year are superseded by new designs the next year. This naturally makes it very difficult for the manufacturer to regulate his stock on hand to meet the present day requirements, and results in some excess stock of telephone equipment accumulating in the factory. It, therefore, becomes necessary for the manufacturer to sell out these excess stocks at reduced prices and make way for stocks in more general demand.

With this, our first issue of the 'Bargain News Bulletin,' we wish to call your attention to some exceptional offerings which we are now prepared to make. You will find listed local and common battery telephones in several well known forms, and some switchboards. None of these equipments consist of second-hand or re-made parts. These articles come from among our regular standard stock and receive the same inspection and test as the latest design of equipment we manufacture. The company back of this 'Quality Apparatus' is the best guarantee of its dependability and quality."

Obviously it will pay telephone buyers to get on the mailing list to receive these bulletins regularly.

The Moon Multiple Top Fuse Terminals.

Good engineering practice demands that efficient and reliable means be provided for taking care of cable at points where subscriber service is necessary; and, furthermore, experience has proven that considerable time and money can needlessly be expended if the cable terminals used, do not provide adequate protection for the cables against high potential currents and excessive lightning discharges. A terminal to be of real service should render easy cable testing, which is frequently found advisable.



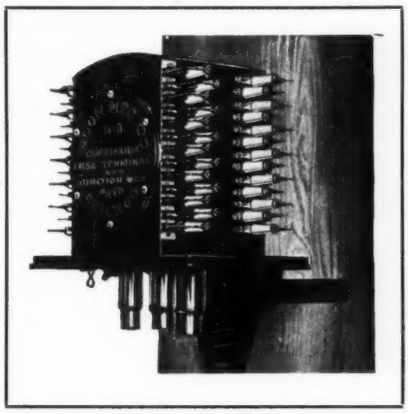
Moon Terminal Closed.

This suffices as an introduction to the Moon Multiple Top Fuse Terminals. Possibly many telephone men are familiar with at least some type of Moon terminals, as the Moon Mfg. Co. has devoted a good many years on terminals and has specialized almost exclusively on terminal manufacture.

While this company has always maintained a good name for producing terminals, it has been creditably modest and has never predicted success for any of its type terminals until the service test assured it of something above the ordinary.

So it is with its Multiple Top Fuse Terminal. This particular type has seen the hardest kind of service and its designer advises that not one case of cable trouble from lightning discharges has ever been reported where it has been installed. Besides being dependable in electric storms, it is said that this type meets all the exigencies of present telephone service; extensions or re-equipping whenever necessary can be made to the lines with little or no difficulty.

The Moon Multiple Top Fuse Terminal is small and compact, and no cutting or fitting, it is said, are necessary to install it on poles. These terminals are made in sizes for distributing from five to 100 pairs of wires, multiplying in from two to five cables. It is said that it is the combination of several good features which permits the terminal to give its satisfactory service. An iron box tightly seals the cable, making it impervious to moisture, gases, etc., which are conducive to deterioration or corrosion. Outgoing or open wires connect with the clips or connections which lie close to the iron box.



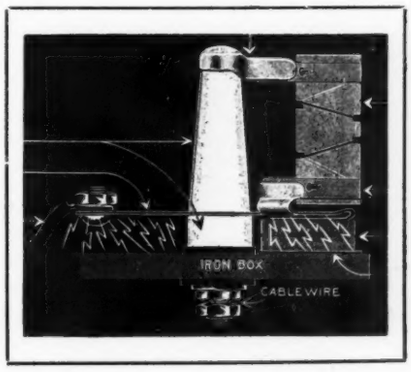
With Cover Removed.

All metal conductors leading from the inside of the box extend a considerable distance beyond it and are heavily porcelain insulated—a double precaution.

All high potential currents coming into proximity with it are attracted by the iron mass of the box and deflected to the ground. And this attraction is in the opposite direction to the open end of the conductor leading in the box to the cable wire.

Because of the care exercised in the selection of the best materials and their proper combination, it is claimed that absolute protection is not only secured, but that the terminal is practically indestructible.

The Moon self-soldering nozzles scored quite a success when they were first introduced. These enable a regular lineman to easily seal the cables, obviating the need of an experienced high-priced special cable splicer. It is said that the seal is a great improvement over the old style of plumber's joint. A double seal is obtained by the pocket in the bottom of box in which, after the cables have been sealed, a small quantity of hot compound or paraffine is poured, sealing the cable wires. Testing or transposing can be done at any time without injury to the cable.



Lightning Discharge Action of Arrester.

The illustrations show the terminal with cover on, with it off and the action taking place when a heavy charge of lightning comes in from an open line.

It is said that further protection from lower potential currents is afforded by carbon blocks in combination with the lower clip or connector. All possibilities of injurious currents reaching the cable are therefore eliminated.

The Moon Mfg. Co., 114 N. Jefferson street, Chicago, would like to correspond with any telephone companies desiring more information concerning this particular type.

Some New Dean Booklets.

The Dean Electric Co., of Elyria, Ohio, has just issued bulletins numbered 107 and 108. The first deals with magneto telephones; the second with the Dean Unit Type Multiple Switchboard. Typographically these pamphlets leave nothing to be desired. They are printed on heavy, high-finished paper and are lightened by many illustrations.

In bulletin 107 the various types of magneto telephones known as the Demo brand, which the company manufactures, are fully described and detailed photographs are reproduced showing every portion of the apparatus. These include the wall type, residence sets, portable telephones, harmonic ringing, four and eight party selective signalling telephones, and all steel desk sets.

Bulletin 108 has this introductory announcement on its front cover:

"For the last few years a great number of our leading operating engineers from different sections of the country have taken up with us from time to time, the question of designing a simple type of multiple switchboard, for exchanges up to 2,000 or 3,000 capacity, to the following specifications:

A small positive line and line cut-off relay that would be compact and light and yet give positive results; full size equipment in the cord circuit that would give maximum talking efficiency; of the unit type so that one position could be added at a time as needed; line equipment mounted on the rear of the section on swinging frames so that the intermediate and relay rack could be abandoned, thus saving an extraordinary amount of space and cable; remainder of equipment to be standard as furnished on the large multiple boards.

This bulletin will show you how we have carefully followed these specifications in our design. We are showing in detail each item that goes in the make-up of this switchboard and can refer you to operating engineer after operating engineer who has used this equipment with positive success—one leading engineer even going so far as to use this type of equipment for a private telephone installation in some of our largest steel plants."

The booklet then goes on to describe the boards in whole and in part, with the same thoroughness of detail which characterizes the other bulletin. In conclusion the company makes the following claim:

"When Dean telephone apparatus was first introduced in 1904 we set a new standard of excellence in the telephone field. We have continued to maintain this lead and today Dean apparatus is perfected to such a degree that it is standard in every sense of the word.

We solicit your telephone patronage on the merits of our apparatus. Our modernized manufacturing layout is smoothly delivering an improved product and we are able to meet your requirements for any type of exchange or station equipment."

Paragraphs.

THE STROMBERG-CARLSON TELEPHONE MFG. CO., Rochester, N. Y., is mailing to the trade some new and attractive literature descriptive of its Deffone, a device designed to aid the deaf. This has been on the market for some time and is said to have met with a most gratifying reception. The receiver is a disc, which may be readily and inconspicuously attached to the head in a manner permitting the free use of both hands. The transmitter is concealed in the clothing. The Deffone increases the intensity of the sound, not its volume, and its results are said to be marvelous.

Century Board Goes to New Zealand.

The Century Telephone Construction Co., of Buffalo, N. Y., has just shipped to New Zealand a 500-line magneto switchboard complete. The specifications covering this board were most exact and every detail was fully met.

Attention is drawn to the fact that Century apparatus enjoys an excellent reputation, both at home and abroad. Considering that the Century company has very largely confined its products to the Federal Telephone & Telegraph Co., and has not generally offered them to the trade, it is held to be the more remarkable that its apparatus has attained such a prominent position. The Federal company, one of the largest and most successful Independent operating companies in the country, uses Century apparatus exclusively.

A Full Equipment in Arkansas.

The Monarch Telephone Mfg. Co., of Fort Dodge, Iowa, is just finishing the installation of the complete central office equipment for the new exchange in Clarksville, Ark. The Johnson County Telephone Co. was organized there a few months ago and work on the outside plant is now practically completed. The Monarch company expects to have the board and other exchange equipment installed by December 1.

When deciding to install a new system in Clarksville, the men interested agreed that the system and the service should be the best procurable. As a consequence the local subscribers in Clarksville will be given common battery service, while the farm line subscribers will be given the most up-to-date magneto party line service. There are a great many farmers in this territory and 30 farm lines terminate in the board. Inasmuch as the connections between farm line subscribers and local subscribers will be a large percentage of all connections put up, the switchboard has been equipped throughout with universal automatic changing cord circuits.

The Monarch circuit used for this purpose is said to be simple and very satisfactory. It makes it possible for an operator to complete a connection between any two lines on the board, whether they be magneto or common battery, without throwing any switching key or changing cords. With this circuit the operation of a switchboard is made easier and more rapid.

In addition to supplying the central office equipment the Monarch Telephone Mfg. Co. is furnishing all the telephone instruments. Three different types are being used, the wooden cabinet business type, desk sets and the Monarch steel box residence.

The Clarksville exchange will start giving service about December 1, and there is declared to be no doubt that this new plant, with good outside construction and with a full equipment of Monarch apparatus, will serve the subscribers well and prove a profitable investment for the stockholders.

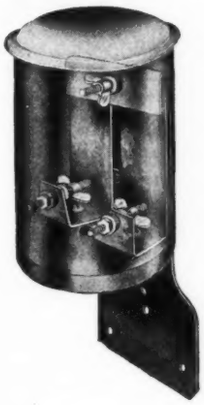
Telephone Operator Saves Village.

Prompt work by Miss Bernice Griffin, a telephone operator, saved the town of Hebron, Porter county, Ind., from destruction by fire. As it was, several buildings were consumed and a loss of $75,000 sustained.

Miss Griffin sent emergency calls to the inhabitants of Hebron telling them of their danger. This action completed, she called Valpariso, Crown Point and other towns for help.

TO INDEPENDENT AND BELL COMPANIES.

In connection with the information we are now gathering for the forthcoming edition of TELEPHONY'S Directory of the Telephone Industry, we are compiling certain additional and unusual statistics. To the end that this data may be comprehensive and as complete as possible, we ask every telephone company to mail us a copy of their latest directory. We trust all will respond promptly, and assure each of you that the courtesy will be appreciated. Please address it to TELEPHONY, Monadnock Block, Chicago.



The Arrester that is getting the attention—

WHY?

Because it is killing that expense of making long drives over party lines looking for a partially grounded carbon, the trouble that is so often difficult and expensive to locate. This accounts for this arrester finding its way into almost every rebuilding order. The day of lightning trouble is passing. Write for particulars and prices.

Metallic Lightning Arrester Company

Winona, Minnesota

Transmitter Mouth Pieces and Moulded Telephone Appliances

OUR QUALIFICATIONS—Largest plant in the world, finest equipment procurable, thirty years' experience.

The Scranton Button Co.

Scranton, Pa.

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The STANDARD *for* RUBBER INSULATION

THE widespread use of a certain make of insulated wire confers upon that particular make a significant degree of distinction. OKONITE bears this distinction because of the quality of its insulation.

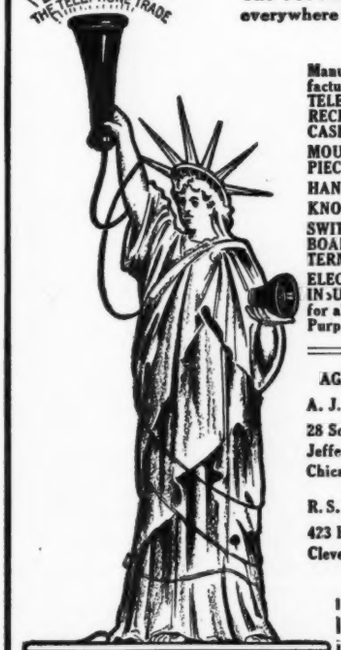
THE OKONITE COMPANY

253 Broadway. New York

"INSULATE SHELL" ENLIGHTENING THE TELEPHONE TRADE

Unequalled mechanical details, strength and finish are the inherent qualities of all the "INSULATE" products.

The foremost Telephone Manufacturers everywhere use the "INSULATE" products.



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"A CELEBRATED CASE"

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GENERAL INSULATE & MACHINE CO.
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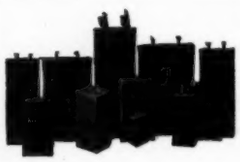

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embody all the essentials of long life and good service. *Write for Literature*
ELECTRIC SPECIALTY CO.
Cresco, Iowa

Let us rehabilitate your Telephone Property for you, Physically and Financially
JONES & WINTER
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Hot Galvanized Pole Line Hardware
MANUFACTURED BY
M. LANZ & SONS - PITTSBURGH, PA.

The Bierce Anchor
One solid piece. Will not creep. Holds in all soils. The best and cheapest anchor on the market.
The Specialty Device Co.
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The One Indispensable Telephone Book

Hall's Hand Book of
STANDARD TELEPHONE CONSTRUCTION METHODS
By
FRANK B. HALL

280 Pages of Specifications.
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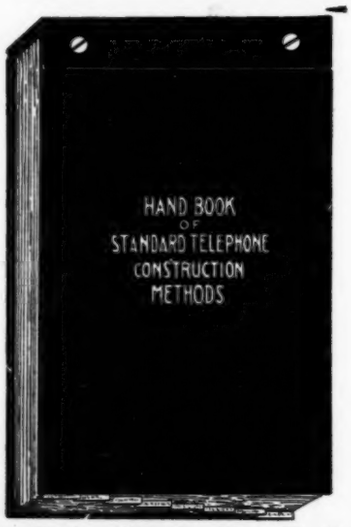

CONTENTS OF HALL'S HAND BOOK OF STANDARD TELEPHONE CONSTRUCTION METHODS

SPECIFICATIONS EXCHANGE AERIAL CONSTRUCTION, Class "A," "B" and "C" Standard Pole Lines, 22 Sections.
SPECIFICATIONS EXCHANGE UNDERGROUND CONSTRUCTION—12 Sections.
SPECIFICATIONS TOLL LINE CONSTRUCTION—Class "D" and "E" Standard Pole Lines, 12 Sections.
SPECIFICATIONS TOLL LINE CONSTRUCTION—Class "F" Standard Pole Line, 5 Sections.
SPECIFICATIONS SUB-STATION WIRING—2 Sections.
MATERIAL SPECIFICATIONS—6 Sections.
MATERIAL CATALOG—25 Pages.
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This Entire Work—Non-Technical and Easily Understood

It is profusely illustrated with actual working plans and diagrams accompanying almost every page of text. It is printed on a good, tough quality of bond paper, pocket size, with binding that will stand hard usage in the field. It is loose-leaf so that one can add to or change pages of drawings or specifications as standards change; or add typewritten tables or other data and thus always have information of the same character properly grouped under one cover.

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Is the time to order. . . . Tomorrow you may have perpetrated some costly blunder which this manual would have helped you to avoid. . . Send money order, currency, or check for $4 to

TELEPHONY PUBLISHING CO., CHICAGO 344-347 MONADNOCK BLOCK

Record of Telephone Patents Recently Issued

1,041,354. October 15, 1912. SELECTIVE SIGNALING: H. O. Rugh and C. S. Rhoads, Jr., Sandwich, Ill.; assigned to Sandwich Electric Co. A telephone system having a central station is divided into two groups of substations. Each group has an electric stepping-up mechanism and a polarized release magnet.

1,041,965. October 22, 1912. PARTY LINE SYSTEM; H. P. Clausen, Chicago; assigned to American Electric Co. Describes a magneto system in which the central office is signaled by direct current and other subscribers on same line are signaled by alternating current. A line relay and impedance coil are in circuit with the line drop, thus preventing the alternating ringing current from operating the drop.

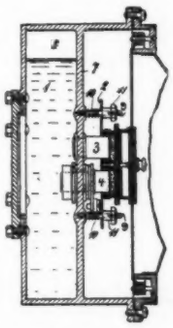
1,042,188. October 22, 1912. ADJUSTABLE LOCKING DEVICE: C. H. Bard, Mt. Vernon, N. Y. Covers a band designed to be locked around the standard of a desk set just above the switch-hook, thus preventing the hook from being operated.

1,042,389. October 29, 1912. TELEPHONE SYSTEM; C. C. Bradbury, Chicago; assigned to Kellogg Switchboard & Supply Co. A cord circuit is described in which the conjoint action of the cord relays controls the supervisory signals.

1,042,482. October 29, 1912. SIGNALING SYSTEM: H. O. Rugh, Sandwich, Ill.; assigned to Sandwich Electric Co. Comprises means for sending and receiving signals over telephone circuits.

1,042,700. October 29, 1912. SIGNAL BOX; A. D. T. Libby, Elyria, Ohio; assigned to Dean Electric Co. Relates to a police box which includes a telephone and an electric signal lamp.

1,042,772. October 29, 1912. CARBON-GRAIN CELLS OF TRANSMITTERS; C. E. Egner, Stockholm, and J. G. Homstrom, Saltsjo-Storangen, Sweden. Comprises a plurality of stationary



1,042,772.

electrodes, each forming the bottom of a transmitter cell, which are connected to a common diaphragm.

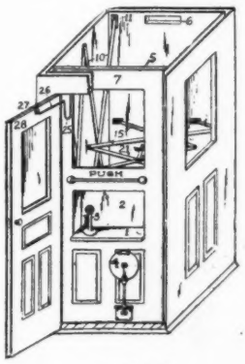
1,042,811. October 29, 1912. RECEIVER HOLDER; W. D. Miller, Butler, Pa. Describes a bracket for holding the receiver when the telephone is being used.

1,042,933. October 29, 1912. TELEPHONE ATTACHMENT; D. W. Leppery, New York. Covers a note pad fed from a roll. It is designed for use on a desk stand.

1,042,954. October 29, 1912. SELECTIVE RINGING KEY; C. H. North, Cleveland, Ohio; assigned to North Electric Co. Relates to a switchboard ringing key with indicator, for party lines.

1,043,043 and 1,043,055. TELEPHONE BOOTH; W. D. Carter, Quincy, Ill. The first patent covers a booth so designed that an inner partition carying the telephone instrument and a seat, must be pushed back into the booth thus expelling all air when a person enters the booth. The later patent provides for the closing of the outer door with the movement of the inner partition.

1,043,219. November 5, 1912. COIN COLLECTOR; O. F. Forsberg, New York; assigned to Western Electric Co. The fea-



1,043,043.

ture is electromagnetic control of the coin deflector into one of two receptacles.

1,043,272. November 5, 1912. TUNING DEVICE FOR WIRELESS TELEGRAPHY AND TELEPHONY: W. E. D. Stokes, Jr., New York, and G. W. Davis, Galilee, N. J.; assigned to W. E. D. Stokes, New York. Relates to a method for the adjustment of inductance by variation of the number of turns in the primary and secondary cells.

1,043,299. November 5, 1912. TELEPHONE SYSTEM; H. P. Clausen, Chicago; assgined to Stromberg-Carlson Telephone Mfg. Co., Rochester, N. Y. Covers a common battery cord circuit with means for shunting the line relay when the operator's plug is inserted into the line jack.

1,043,300. November 5, 1912. TELEPHONE SYSTEM; H. P. Clausen, Chicago; asigned to Stromberg-Carlson Telephone Mfg. Co., Rochester, N. Y. Relates to supervisory and line signals and impedance coils connected with the cord circuit.

1,043,301. November 5, 1912 TELEPHONE SYSTEM; H. P. Clausen, Chicago; assigned to Stromberg-Carlson Telephone Mfg. Co., Rochester, N. Y. Describes a system of trunking between two common battery exchanges.

1,043,306. November 5, 1912. TRUNKING TELEPHONE SYSTEM; A. H. Dyson; assigned to Stromberg-Carlson Telephone Mfg. Co., Rochester, N. Y. The operative combination of two switchboards of different types is described. Special relay control for the lamp signals is provided.

1,043,307. November 5, 1912. SWITCHING KEY; E. G. Eidam, Rochester, N. Y.; assigned to Stromberg-Carlson Telephone Mfg. Co. The construction details of a listening and ringing key are given.

1,043,314. November 5, 1912. TELEPHONE SYSTEM; C. L. Goodrum, Atlantic City, N. J.; assigned to Stromberg-Carlson Telephone Mfg. Co., Rochester, N. Y. Covers line signal operation and control.

1,043,526. November 5, 1912. TELEPHONE; R. H. Lindal, Gloucester City, N. J. Describes a telephone circuit spirally arranged in the towing hawser between two vessels.

Condensed News Reports

Officers of Companies are Earnestly Requested to Forward Us Promptly All Financial and Other Statements as Soon as Issued, and Any Items of Interest as to Their Plants and Systems

Personal.

NELLE BRYANT, chief operator, of the Monmouth Telephone Co., and Fred Norris were married November 6 at Monmouth, Ill.

JOSEPH MILLER, superintendent and manager of the Fountain Telephone Co., at Covington, Ind., has been appointed superintendent of the Covington Electric Light & Water Works Co.

F. W. YENSON has been appointed general superintendent of traffic for the Southwestern Telegraph & Telephone Co., with headquarters at Dallas, Texas, succeeding H. T. McBride, assigned to special service.

JAMES R. CARTER, formerly division traffic chief in Norfolk for the Nebraska Telephone Co., Norfolk, Neb., has been appointed division traffic chief, succeeding A. R. Kelly, who is transferred to Iowa. Mr. Carter has recently been assistant district manager at Omaha.

H. R. MARTIN, manager of the Federal Telephone & Telegraph Co.'s Watkins and Montour Falls, N. Y., exchanges, has

also been appointed manager of the Penn Yan exchange. Mr. Martin will make his headquarters at Penn Yan.

GEORGE S. REINOEHL, formerly of Lebanon, Pa., has been appointed manager of the Harrisburg division of the Bell Telephone Co. He was manager of the Lebanon, Reading, Scranton, Philadelphia and Pittsburgh, Pa., exchanges in succession, and now succeeds J. Heron Crossman, of Harrisburg.

FRED A. DOLPH, general counsel for the Inter-State Independent Telephone & Telegraph Co., of Aurora, Ill., and formerly its receiver and general manager, was married on Wednesday to Miss Katherine F. Jungles. Mr. Dolph has maintained law offices in Chicago for many years, during the past twelve of which Miss Jungles has been his private secretary.

Fred A. Dolph.

The telephone field, particularly in Illinois and adjoining states, is familiar with the capable manner in which Mr. Dolph, as chief executive of the Inter-State company, under the guidance of the court, administered the affairs of his company, held it in the Independent ranks and brought order out of the chaos which obtained when he took hold of it. When the reorganization took place and the present owners of the company took it out of the receiver's hands, Mr. Dolph was retained as general counsel.

He is a man of strong and attractive personality and has made hosts of friends in the telephone industry who will extend him their hearty good wishes on this happy occasion. Mrs. Dolph is a charming young woman, who combines with her many delightful personal qualities, a marked business ability. TELEPHONY offers sincere congratulations to both parties to the new contract, in which it is certain the field will join.

HUGH TAYLOR, the assistant treasurer of the Federal Telephone & Telegraph Co., of Buffalo, N. Y., is gaining quite a reputation as a fruit grower. His particular hobby is apples. Not long ago the Buffalo office received from Mr. Taylor's East Aurora orchard two barrels of fine apples with his compliments. Everyone who was fortunate enough to get some of them said they were excellent.

Obituary.

ALFRED S. HAYES, a corporation lawyer, of Boston, Mass., who has been interested to a considerable extent in the Metropolitan Home Telephone Co., in that city, is reported to have taken his own life at his home, in Hopkinton. Worry over various unsuccessful business ventures is given as the cause of his act.

VIC. H. STEVENS, one of the pioneers of the Independent industry in Iowa, died recently at Dubuque. Mr. Stevens was for years prominently identified with the Dubuque Telephone Co., his connection with that organization ceasing only when it was sold to the Bell company a few years ago.

New Companies.

ST. PAUL, MINN.—The Lynd Farmers' Telephone Co. has been chartered with $5,000 capital stock. The incorporators are William Banks, F. W. Vanstrom and others.

FARMINGTON, ME.—Articles of incorporation have been filed by the Eustis Telephone Co., with $5,000 capital stock. The directors are Herbert H. Landers, William H. Sylvester and Alvah A. Berry. Officers chosen are as follows: President, Herbert H. Landers; treasury, William H. Sylvester, and clerk, Guy Sedgeley.

NEW ENGLAND, N. D.—The Rainy Butte Telephone Co. has been organized with George De Walt as president, J. A. Elliott, treasurer and Carl Ackerman, secretary.

TOWER CITY, N. D.—A charter has been granted the Northern Rural Telephone Co. The incorporators are Geo. O. Goulet, Herbert L. Taylor, W. O. Clara, Daniel Miller and W. C. Cray. The capital stock is $6,000.

REPUBLIC, O.—A mutual telephone company has been organized here, and work of constructing the lines will begin in the near future. Officers of the company are as follows: President, E. J. Hartzell; vice-president, A. G. Miller; secretary, C. E. Womer, and treasurer, Robert D. Straub.

KONAWA, OKLA.—The Fairchild Telephone Co., has been incorporated with $500 capital stock. The officers are Tom Bennett, president; R. W. Mann, secretary; and W. M. Durson, treasurer.

Construction

HUGHSON, CAL.—The Hughson Telephone Co. has completed negotiations for a building site and will arrange as soon as possible to start work on a new building for the permanent home of the central office.

INDIANAPOLIS, IND.—The New L. D. Telephone Co. will invest $40,000 in improvements in its plant in Columbus. The company will also make valuable improvements in Lebanon.

MT. PLEASANT, IOWA.—The Mt. Pleasant Telephone Co. will soon start work on its new exchange building.

Financial.

CHASE, KANS.—The Chase Co-operative Telephone Co., has increased its stock from $8,000 to $10,000.

MANOR, TEX.—The Farmers' Telephone Co., has filed an amendment to its charter and increased the capital stock from $3,500 to $7,000.

EDGERTON, WIS.—The Edgerton Telephone Co. has increased its capital stock from $18,000 to $25,000. F. W. Coon is president.

Elections.

SHELBURNE FALLS, MASS.—The annual meeting of the Heath Telephone Co. has been held and the following officers elected: President and general manager, Walter E. Kinsman; vic-president, Fred W. Story; secretary and treasurer, Herbert Newell. The directors are Walter E. Kinsman, Fred W. Story, Jasper N. Keller, Fred H. Smith, Charles L. Donelson, William A. Barber, Matt B. Jones, Alexander J. Patterson, Carl T. Keller, Charles S. Goodnow and Herbert Newell.

DUNDEE, MICH.—The Dundee & Ozalia Farmers Telephone Co. have elected the following officers for the coming year. J. B. Haynes, Dundee, president; and A. T. Jones, Detroit, secretary.

SPOKANE, WASH.—The stockholders of the Inland Telephone & Telegraph Co. held their annual meeting recently and elected the following officers: G. R. Boomer, president; and L. B. Cornell secretary and treasurer.

HILLSBORO, ILL.—The Peoples Mutual Telephone Co. have elected the following officers for the coming year: V. A. Bost, Fillmore, president; Rufus Cruthis, Sorento, vice-president; B. A. Stead, Farmersville, treasurer; and W. R. McLean, manager.

Underground.

CARLINVILLE, ILL.—The Macoupin County Telephone Co. will place its wires in the business district, underground. A contract will be let soon for a two story brick building to be used as an exchange and store room.

Miscellaneous.

CARLINVILLE, ILL.—The Carlinville Telephone Co. and the Macoupin Telephone & Telegraph Co. have been sold to E. S. Sterret, of Henry, Ill., and C. B. Cheadle, of Henry, Ill.

DEKALB, ILL.—Stockholders of the Exchange Telephone Co. have voted to sell the wires, poles and general equipment to the DeKalb County Telephone Co.

QUINCY, ILL.—The Central Union Telephone Co. has purchased the property of the Home Telephone Co. in this place. The Central company has been granted a thirty-five-year franchise.

CAMBRIDGE CITY, IND.—The Citizens' Telephone Co. has taken over the property of the Winchester Telephone Co.

ELLSWORTH, MINN.—The Ellsworth Automatic Telephone Co. has sold its exchange to purchasers from Worthington and the business has become a part of the Midland Telephone Co's. system.

CHAPEL HILL, N. C.—The Chapel Hill Telephone Co. has been bought by J. C. Taylor, M. E. Hogan and John W. Markham, of Durham.

FARMINGTON, UTAH.—The Home Telephone & Electric Co. has been sold to F. L. Dame.

PRESCOTT, WIS.—The Prescott telephone exchange has been sold by Herman Mercord to Joseph Baker.